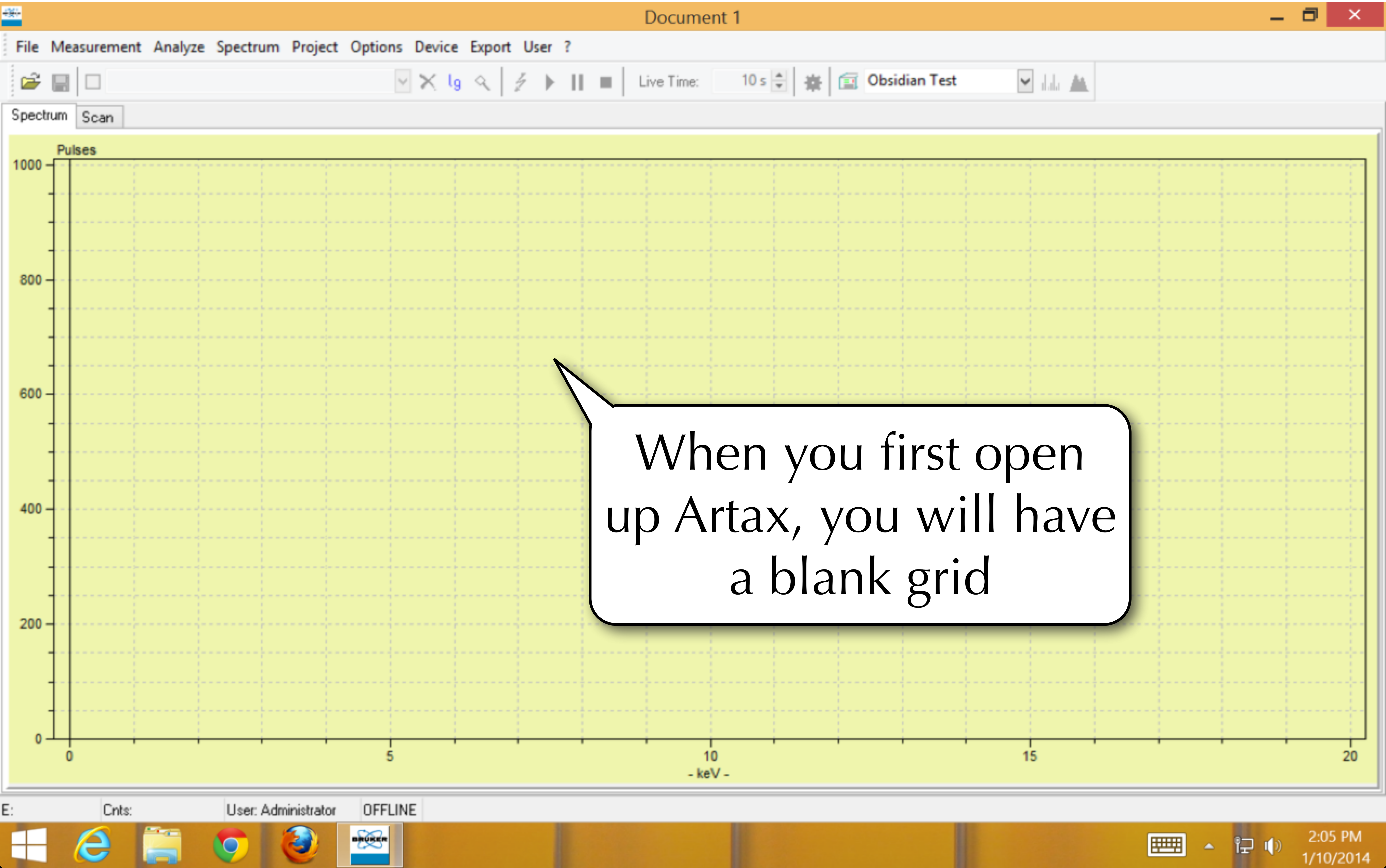
Bayesian Deconvolution

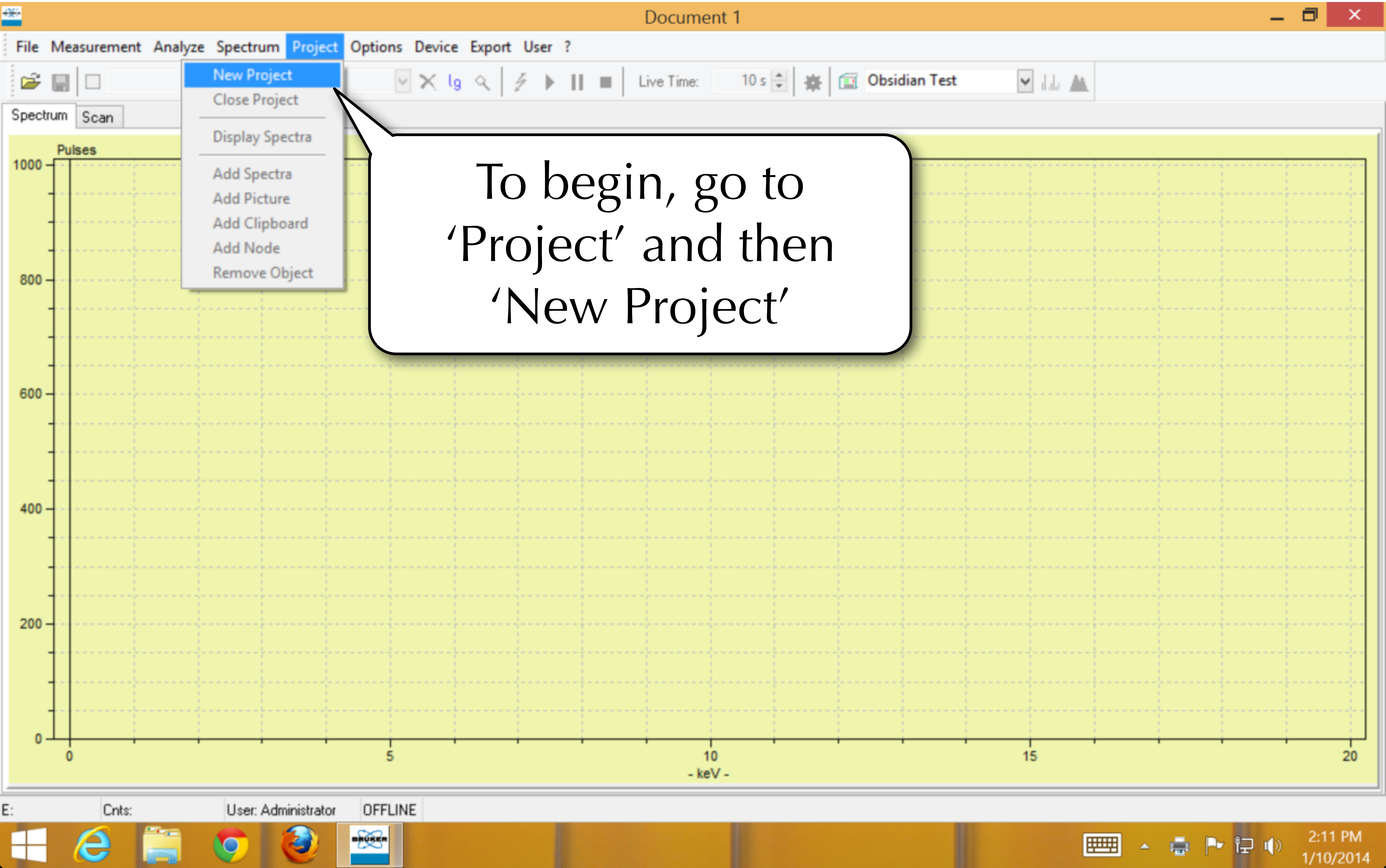
This presentation is designed to provide a step-by-step followthrough. If you have any questions, do not hesitate to contact us.

Bayesian Deconvolution

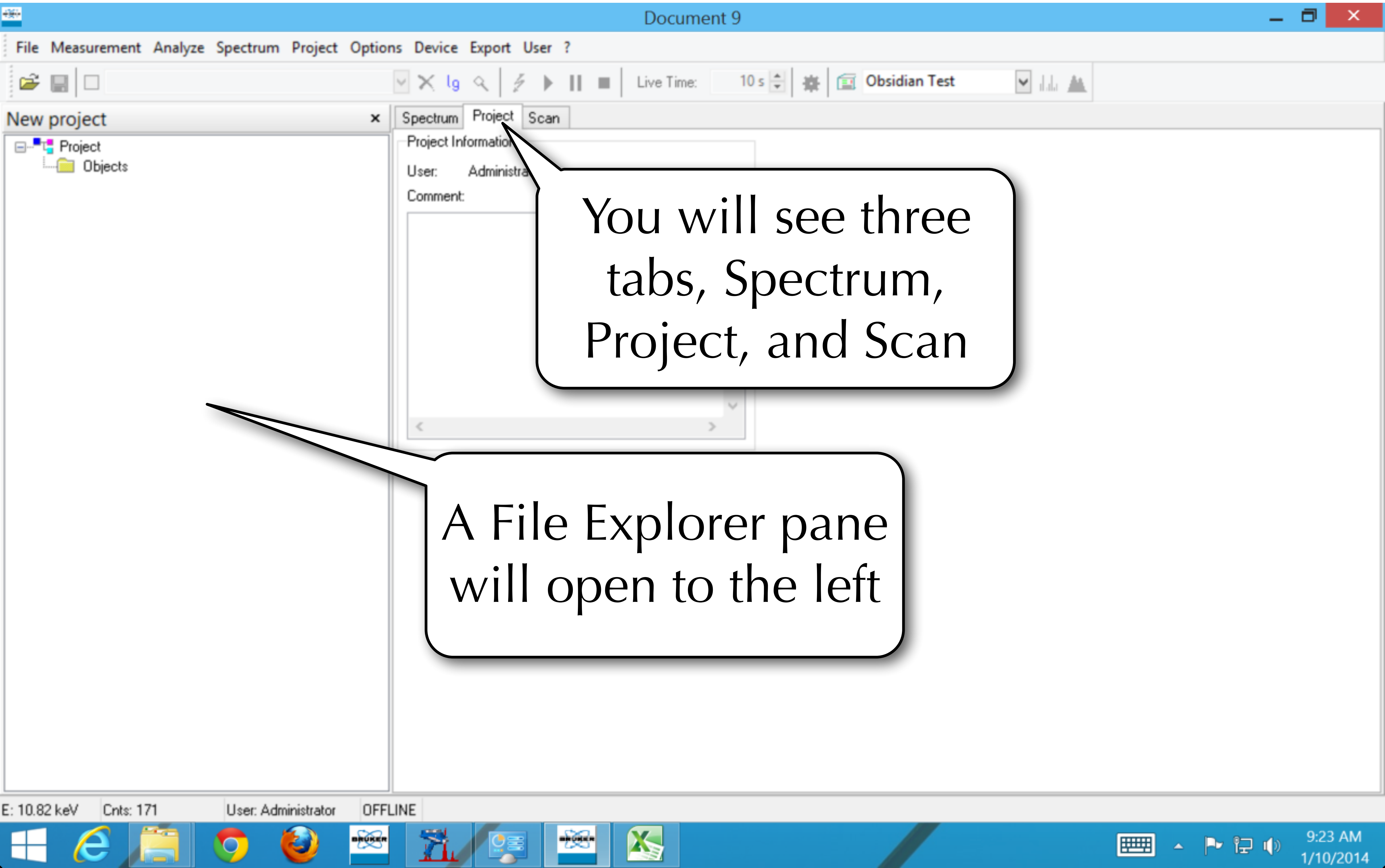


When you first open up Artax, you will have a blank grid

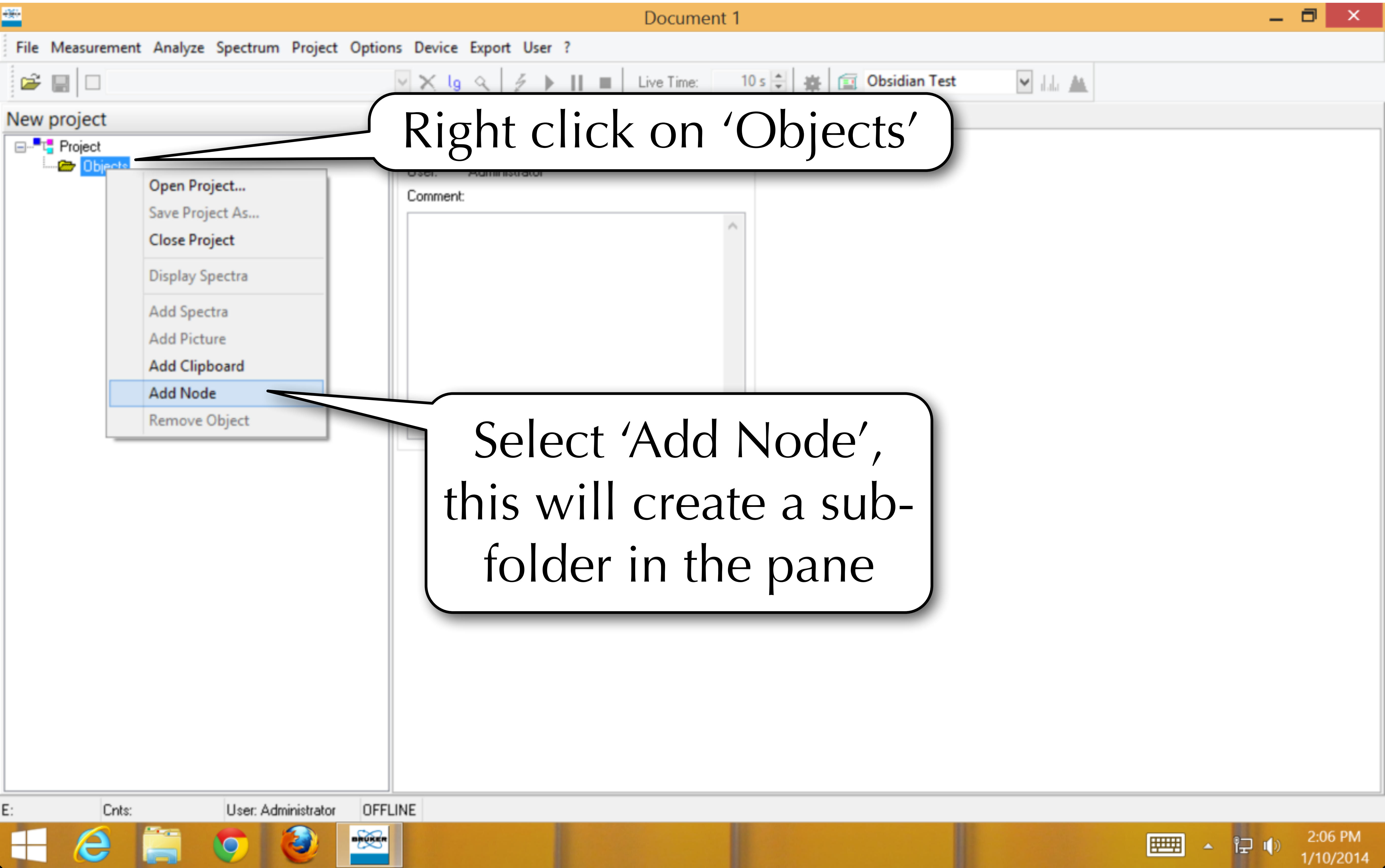
Bayesian Deconvolution



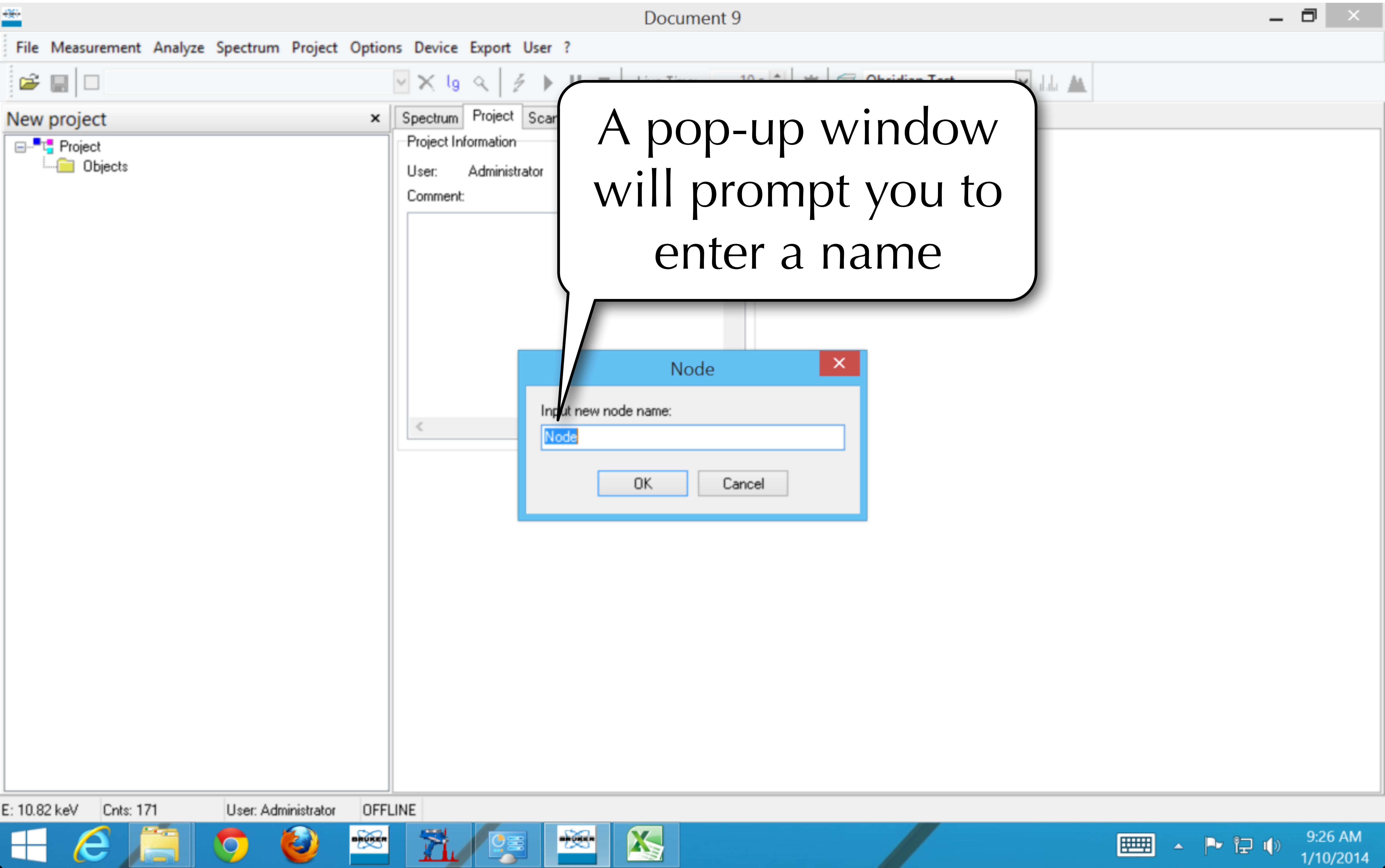
Bayesian Deconvolution



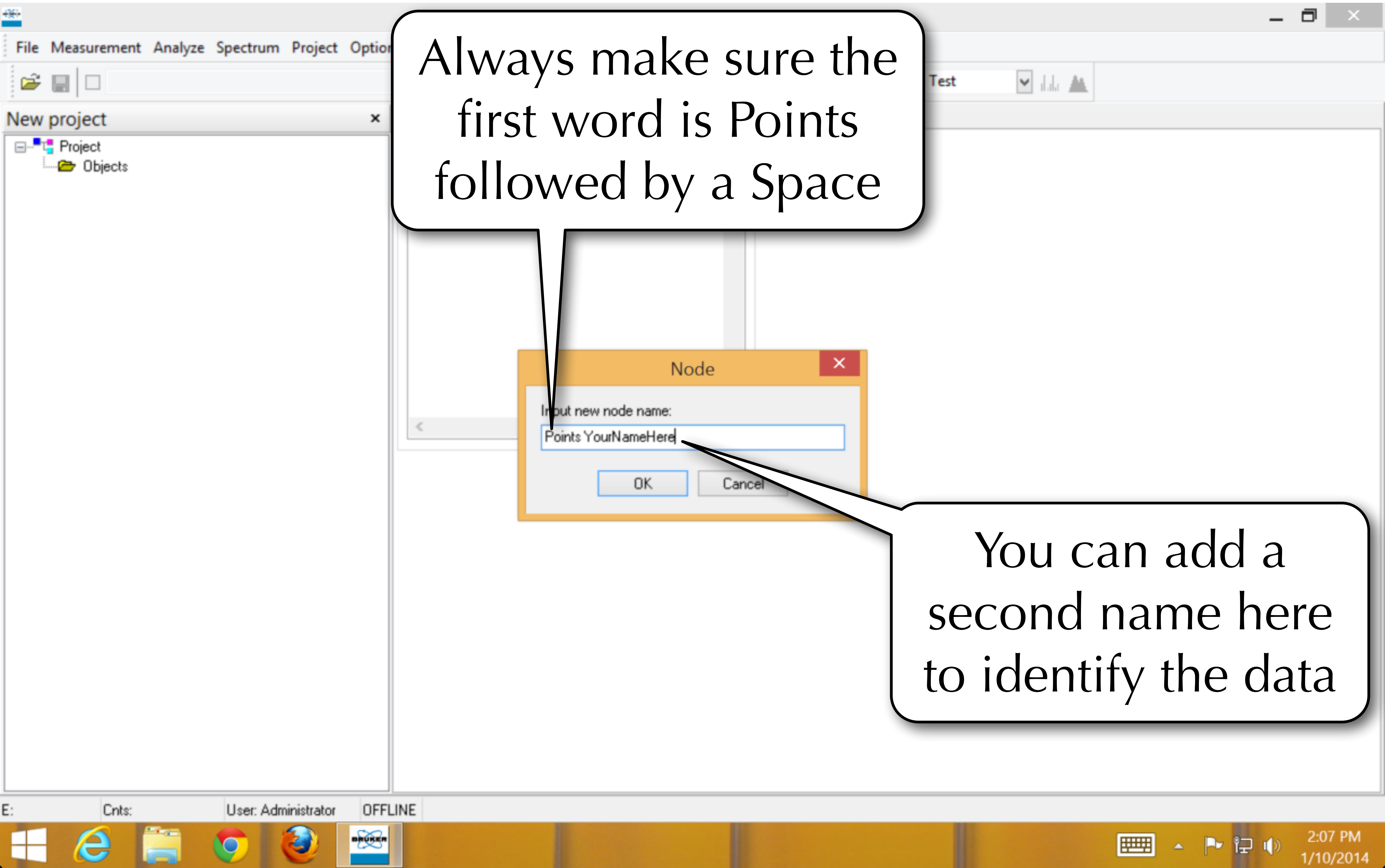
Bayesian Deconvolution



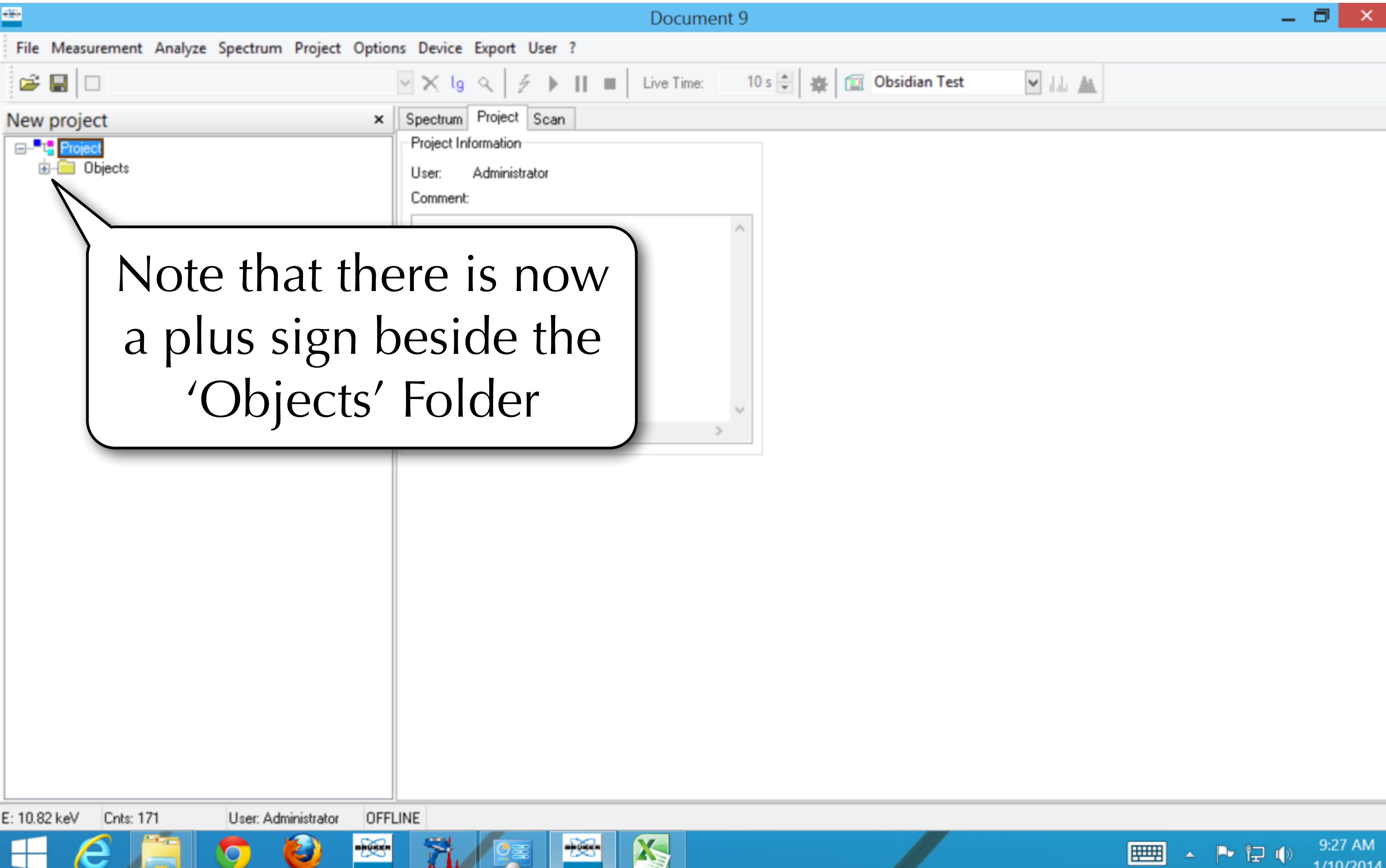
Bayesian Deconvolution



Bayesian Deconvolution

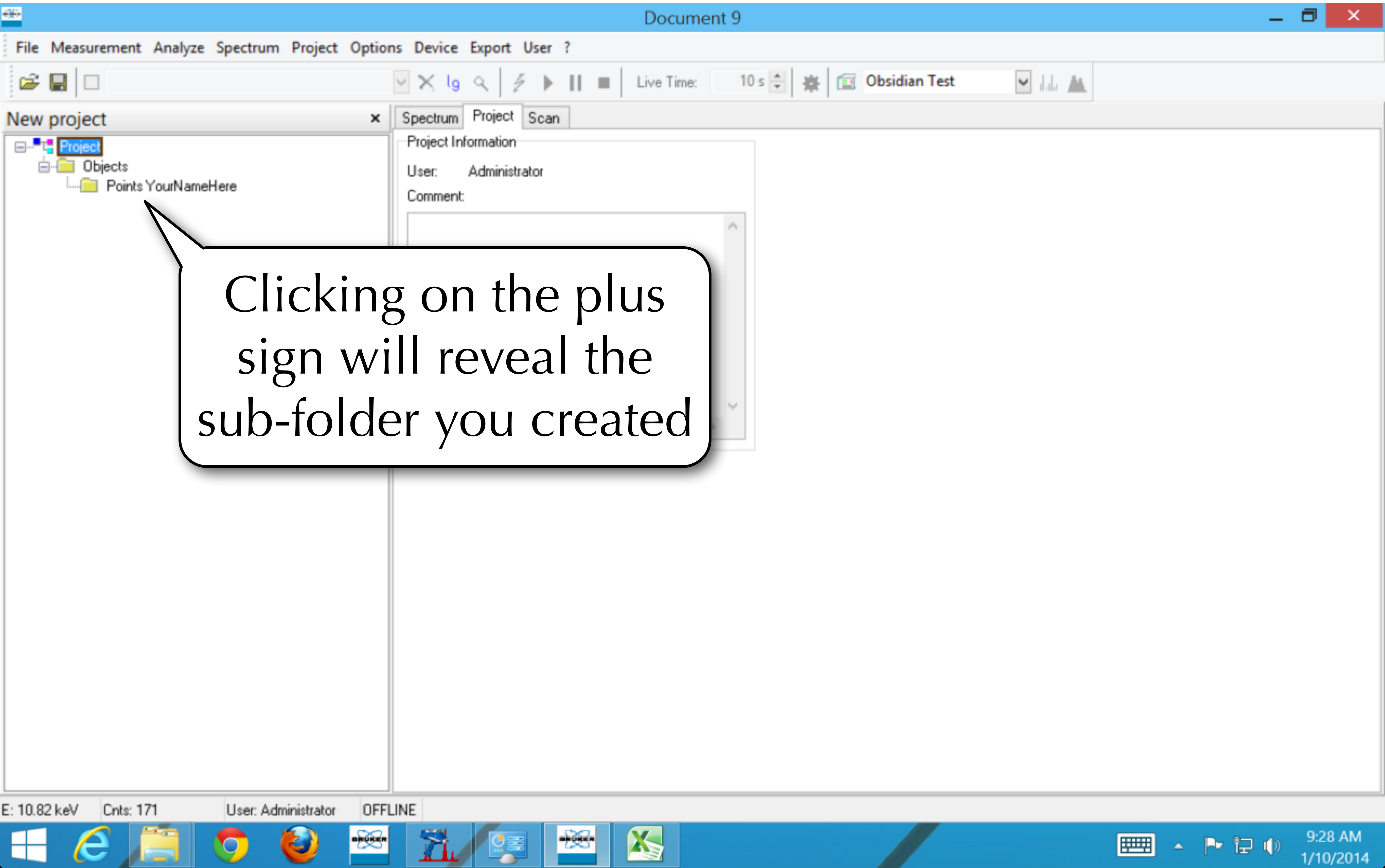


Bayesian Deconvolution



Note that there is now a plus sign beside the 'Objects' Folder

Bayesian Deconvolution



Bayesian Deconvolution

Document 9

File Measurement Analyze Spectrum Project Options Device Export User ?

Live Time: 10 s Obsidian Test

New project

Project
Objects
Points YourNameHere

Spectrum Project Scan

E3 Pulses

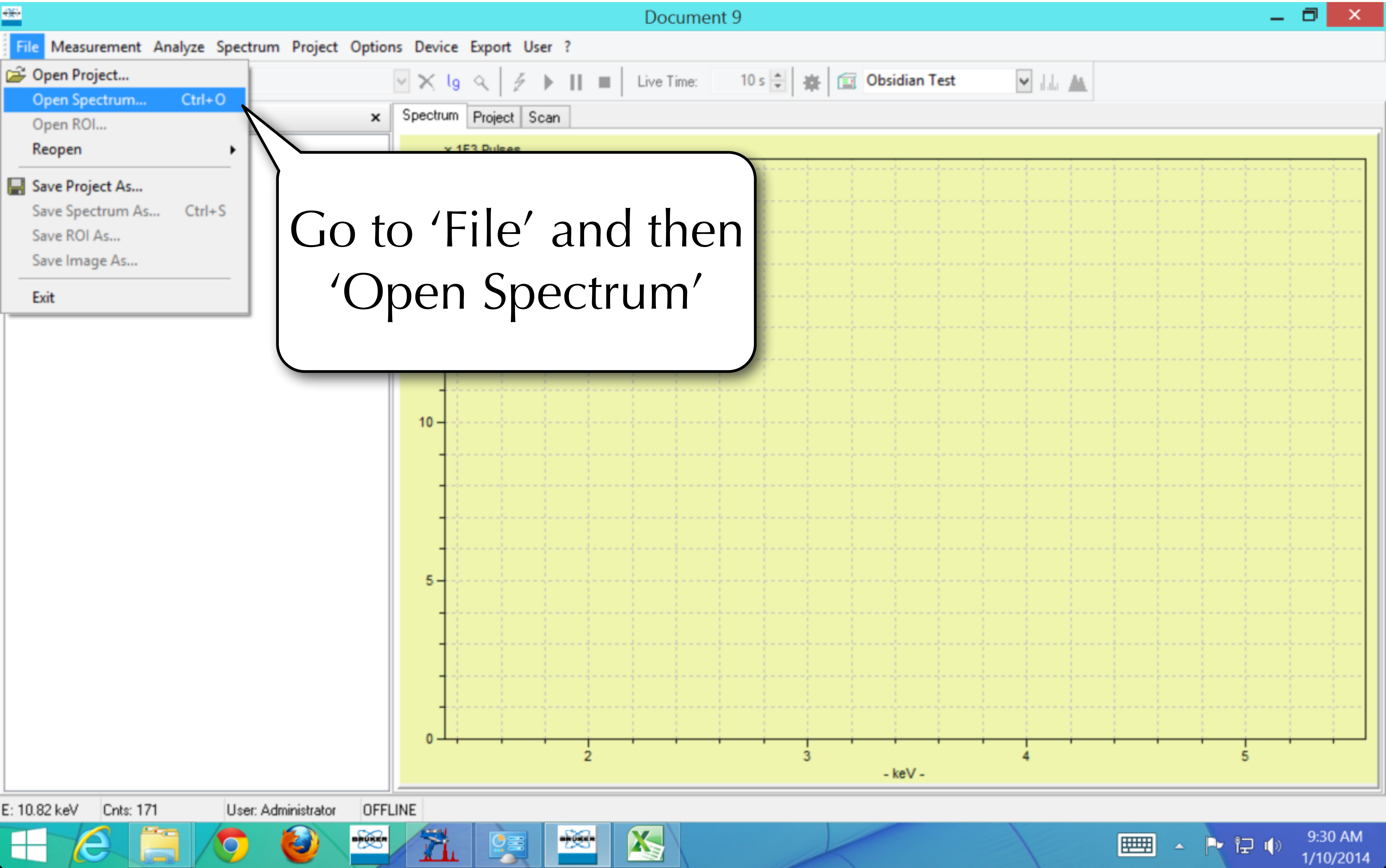
Click on the ‘Spectrum’ tab to show the grid again

15
10
5
0
2
3
4
5
- keV -

E: 10.82 keV Cnts: 171 User: Administrator OFFLINE

9:29 AM
1/10/2014

Bayesian Deconvolution



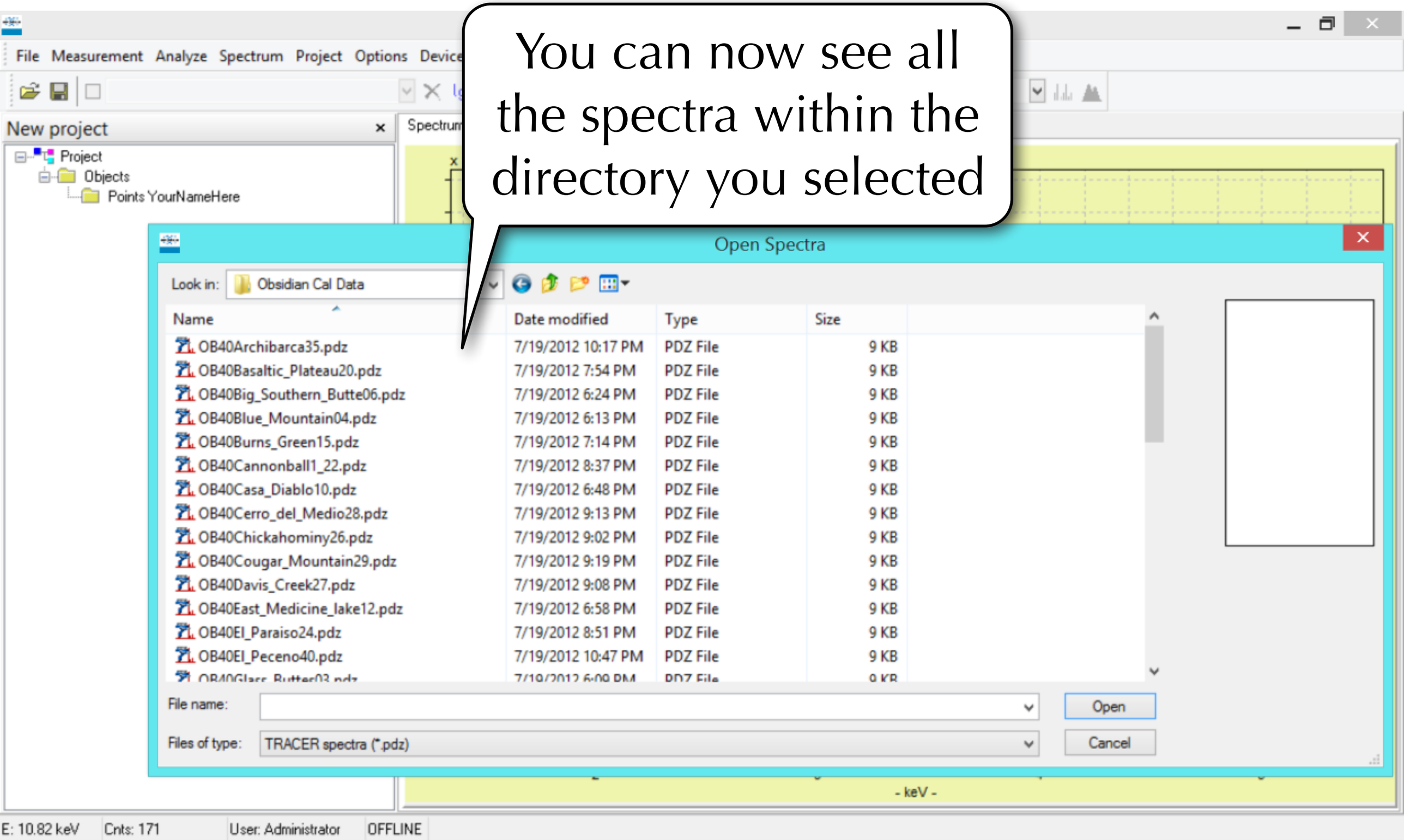
Bayesian Deconvolution

A File Explorer window will open

Select ‘TRACER spectra (“.pdz”)’ to find your data

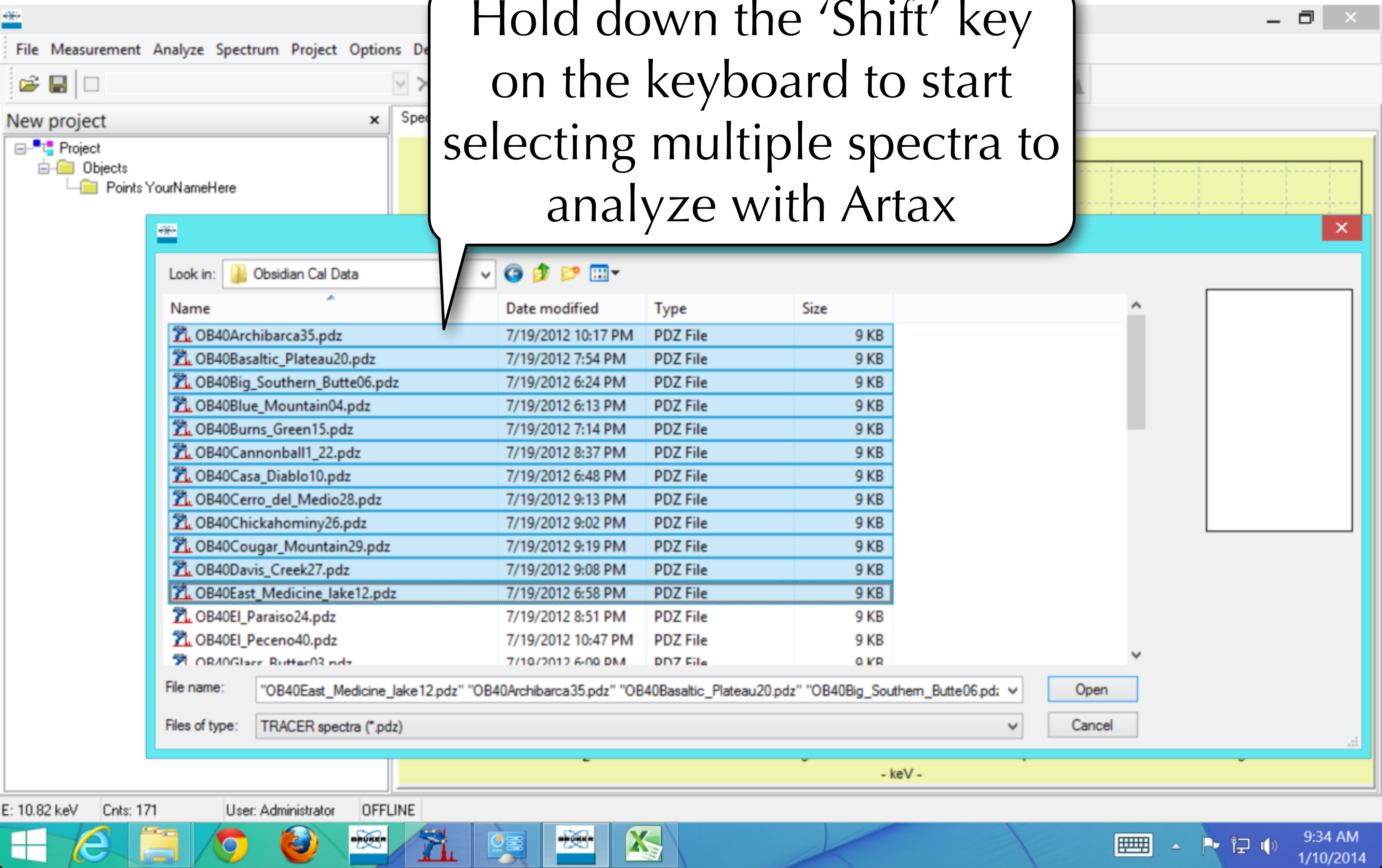
Bayesian Deconvolution

You can now see all the spectra within the directory you selected

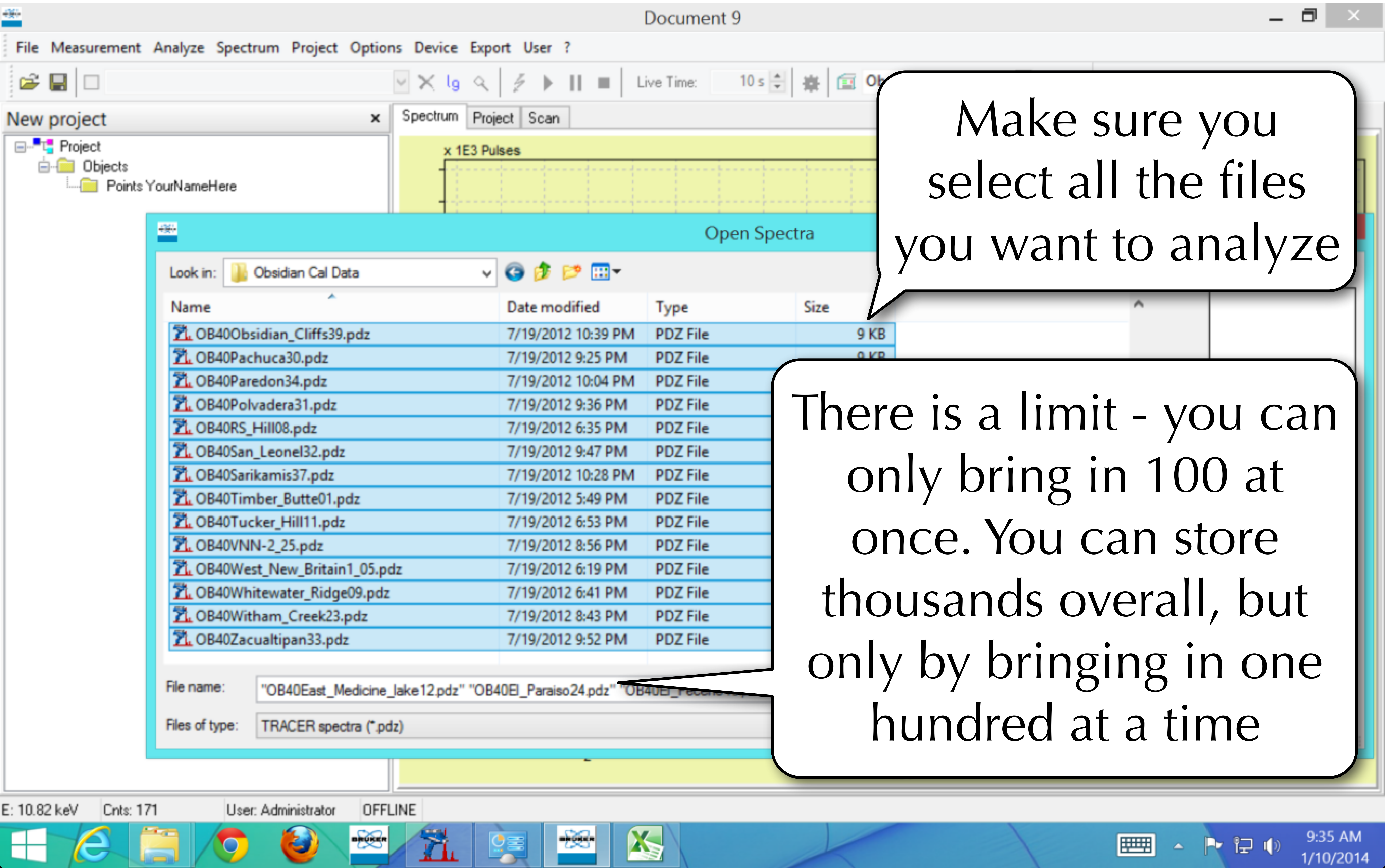


Bayesian Deconvolution

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



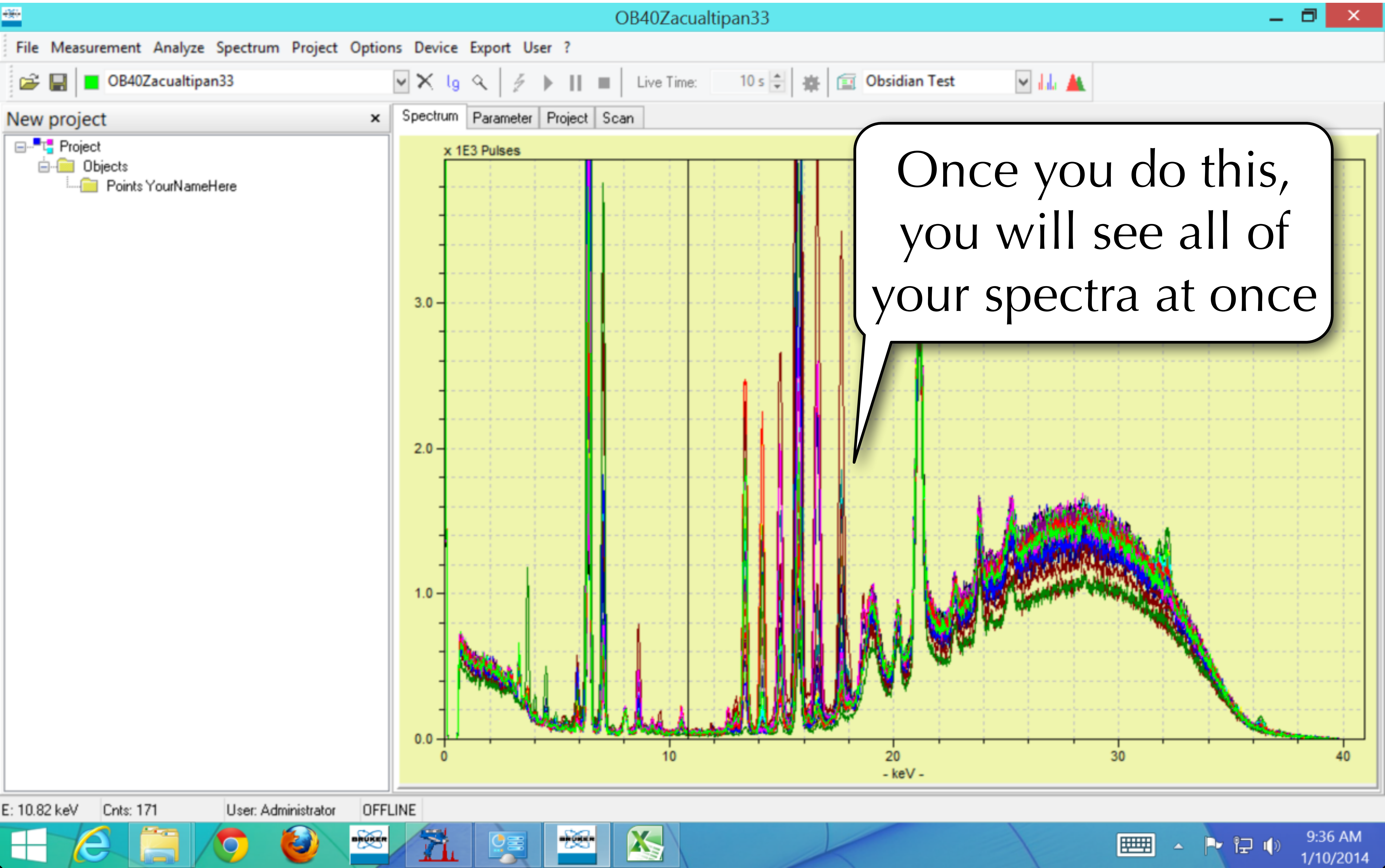
Bayesian Deconvolution



Make sure you select all the files you want to analyze

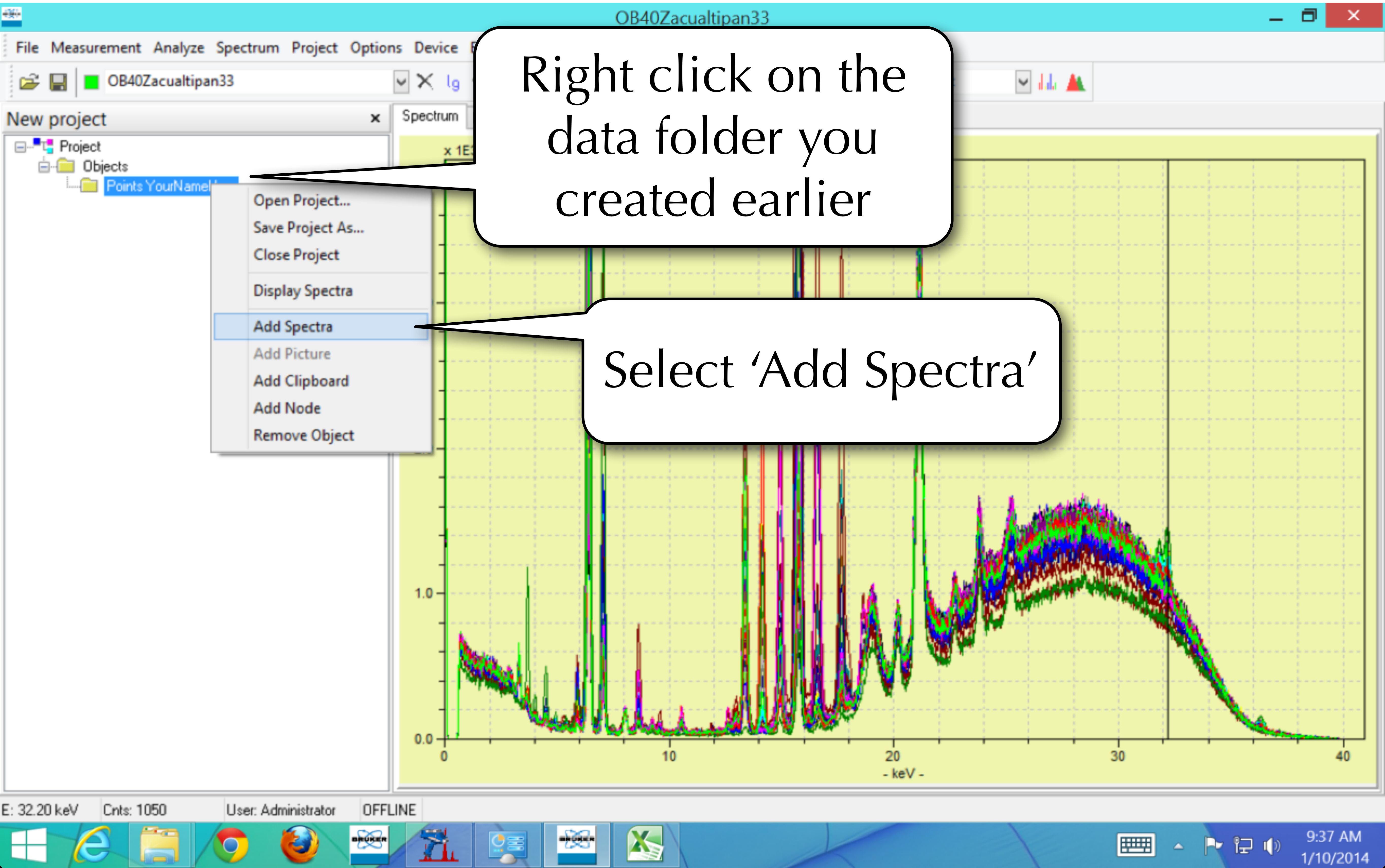
There is a limit - you can only bring in 100 at once. You can store thousands overall, but only by bringing in one hundred at a time

Bayesian Deconvolution

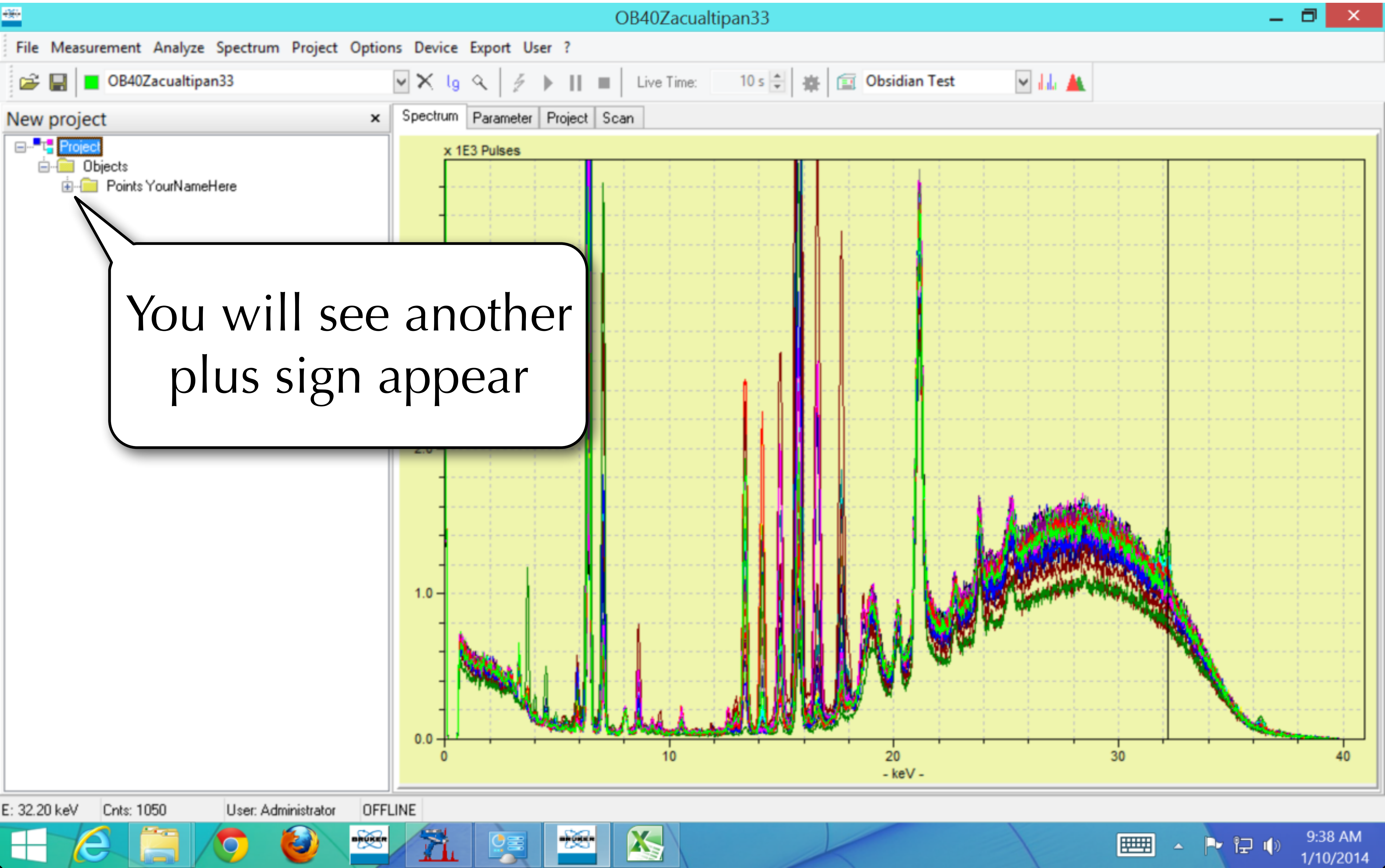


Once you do this, you will see all of your spectra at once

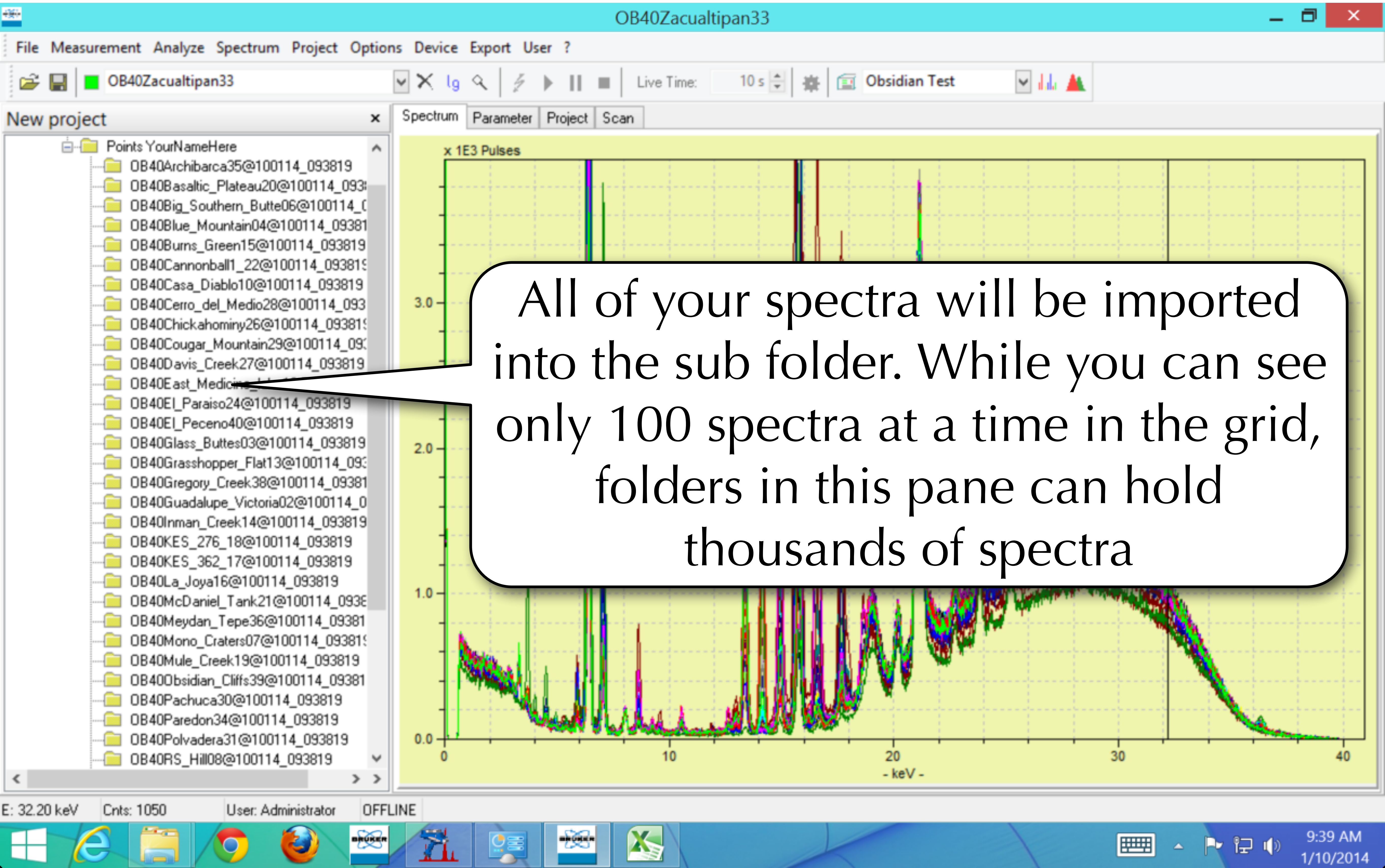
Bayesian Deconvolution



Bayesian Deconvolution

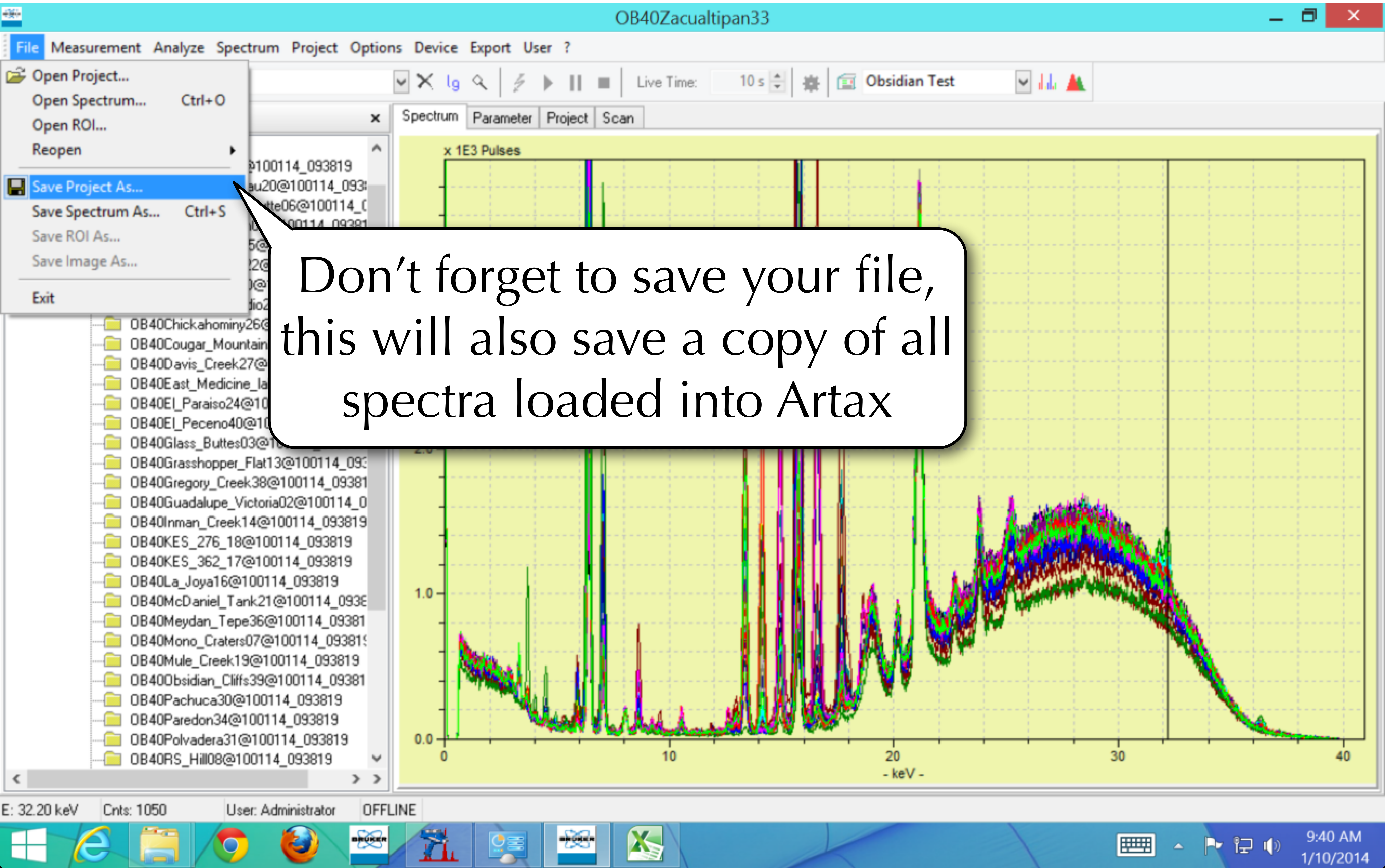


Bayesian Deconvolution



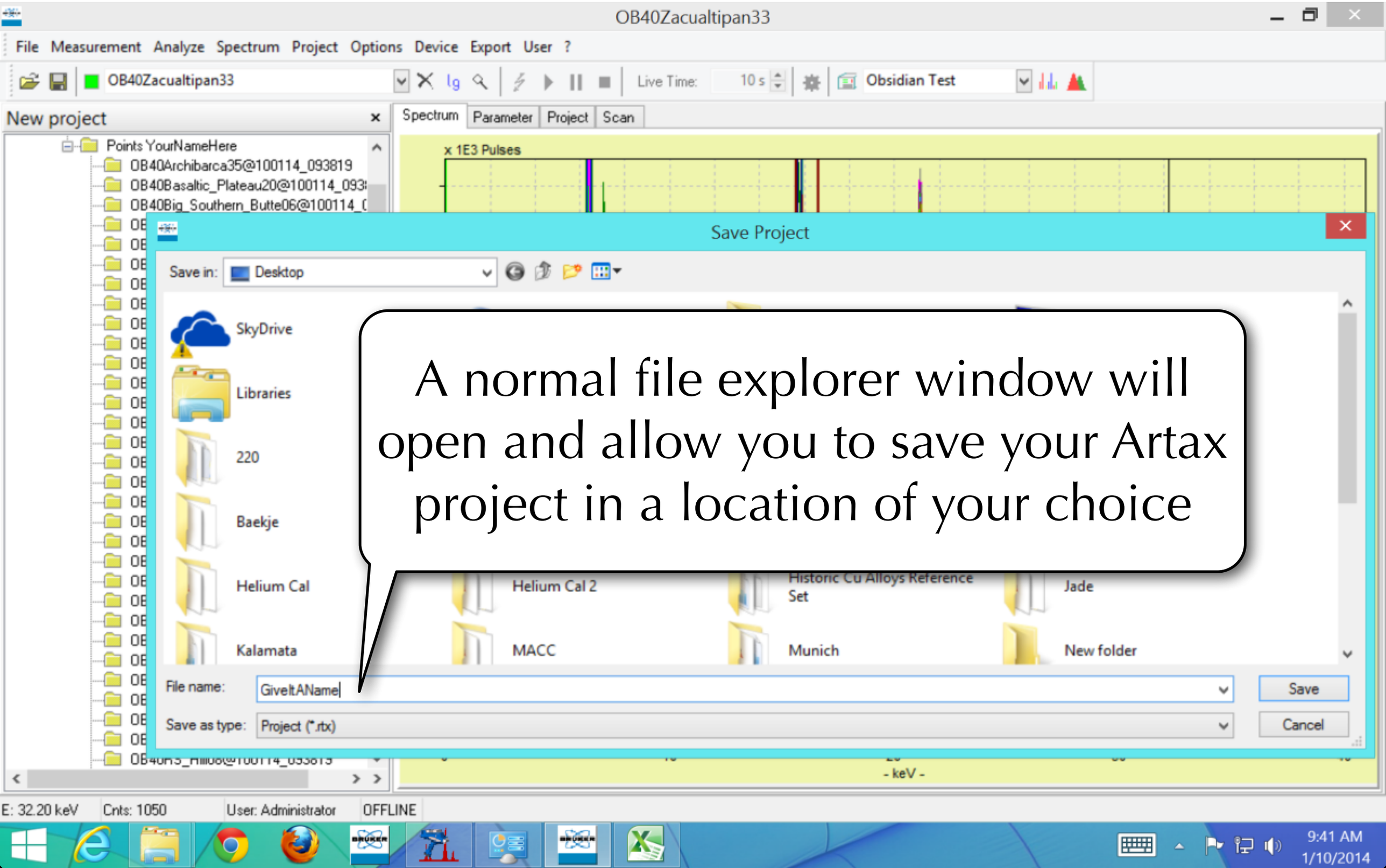
All of your spectra will be imported into the sub folder. While you can see only 100 spectra at a time in the grid, folders in this pane can hold thousands of spectra

Bayesian Deconvolution



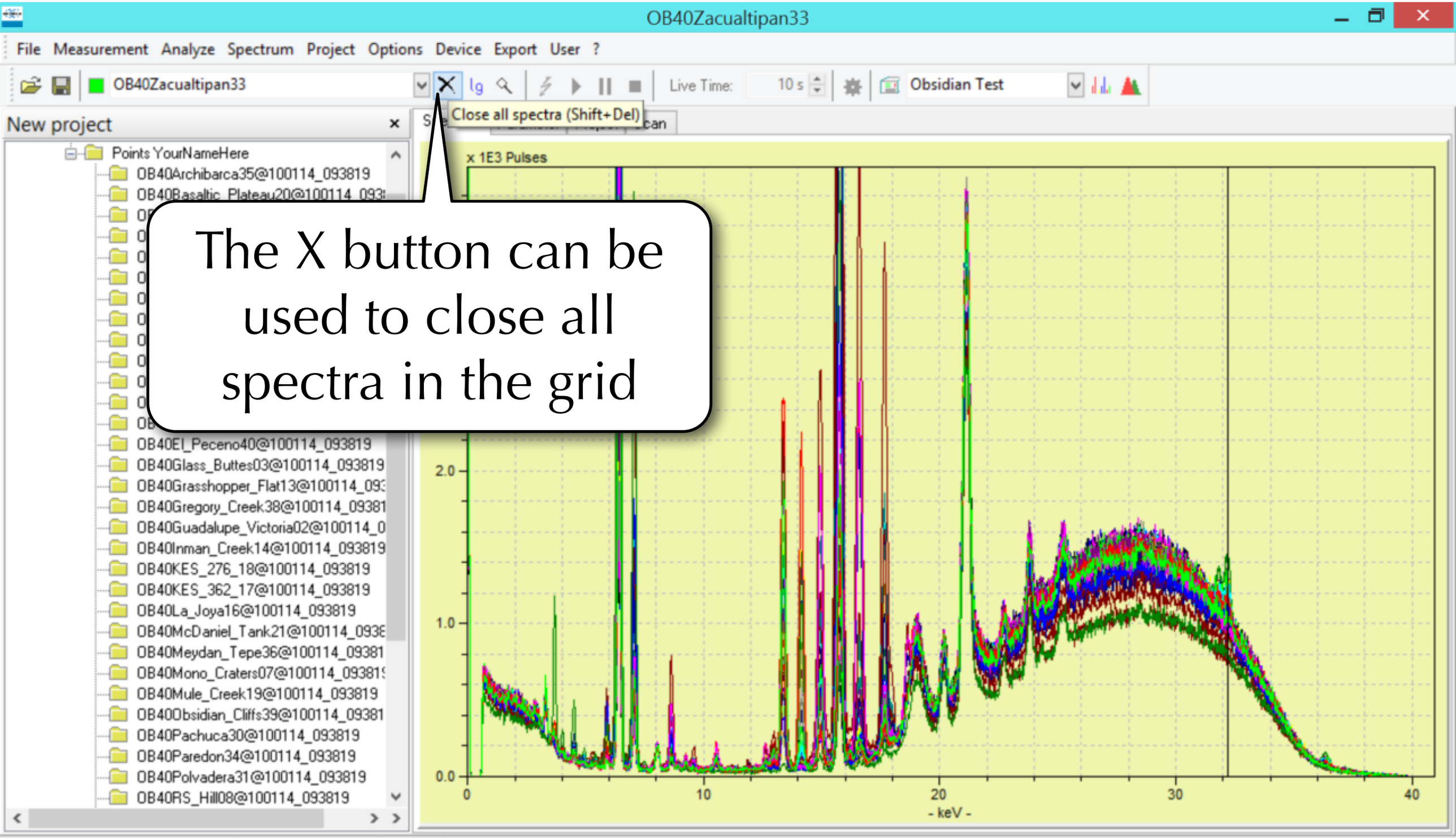
Don’t forget to save your file, this will also save a copy of all spectra loaded into Artax

Bayesian Deconvolution



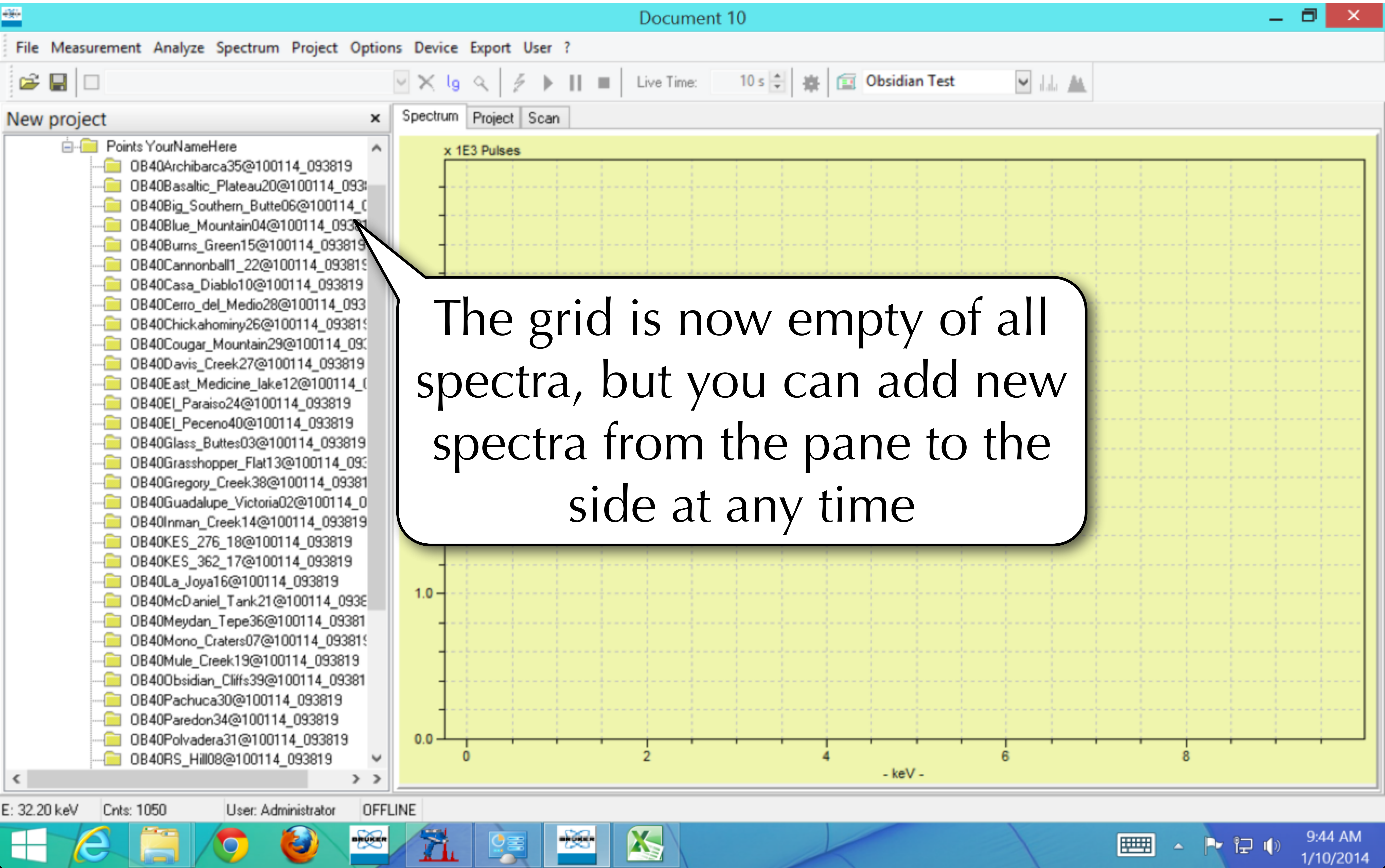
A normal file explorer window will open and allow you to save your Artax project in a location of your choice

Bayesian Deconvolution



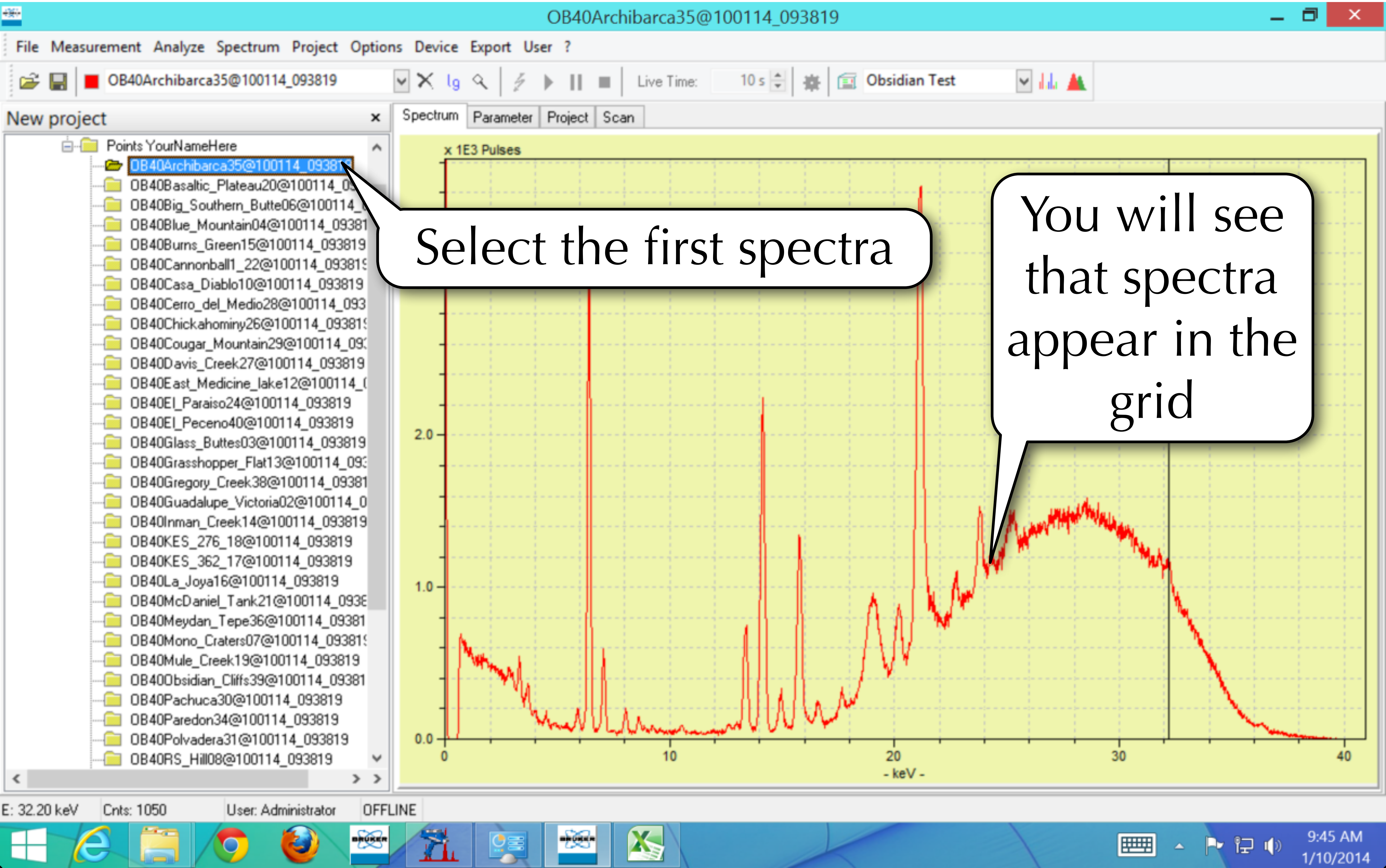
The X button can be used to close all spectra in the grid

Bayesian Deconvolution

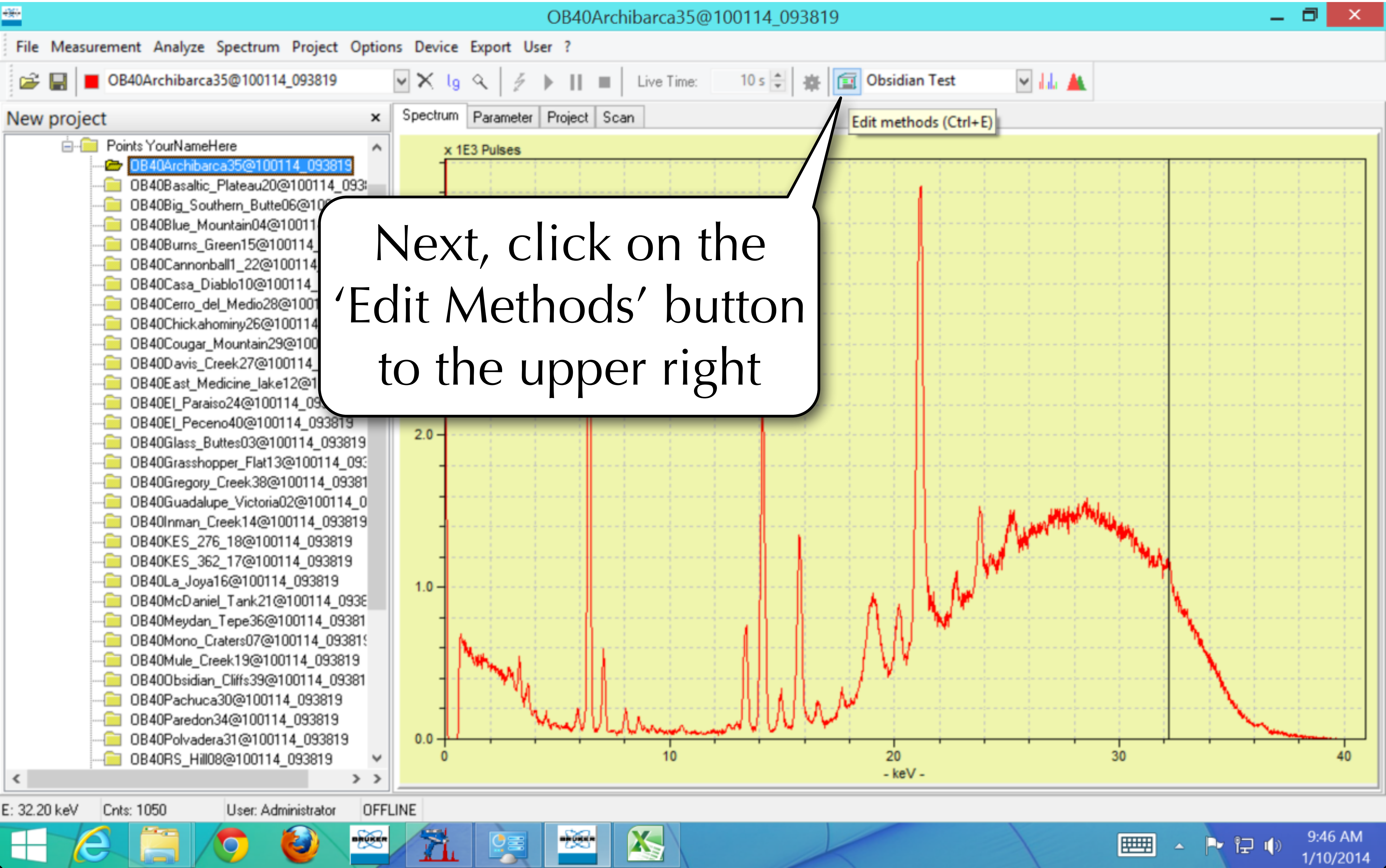


The grid is now empty of all spectra, but you can add new spectra from the pane to the side at any time

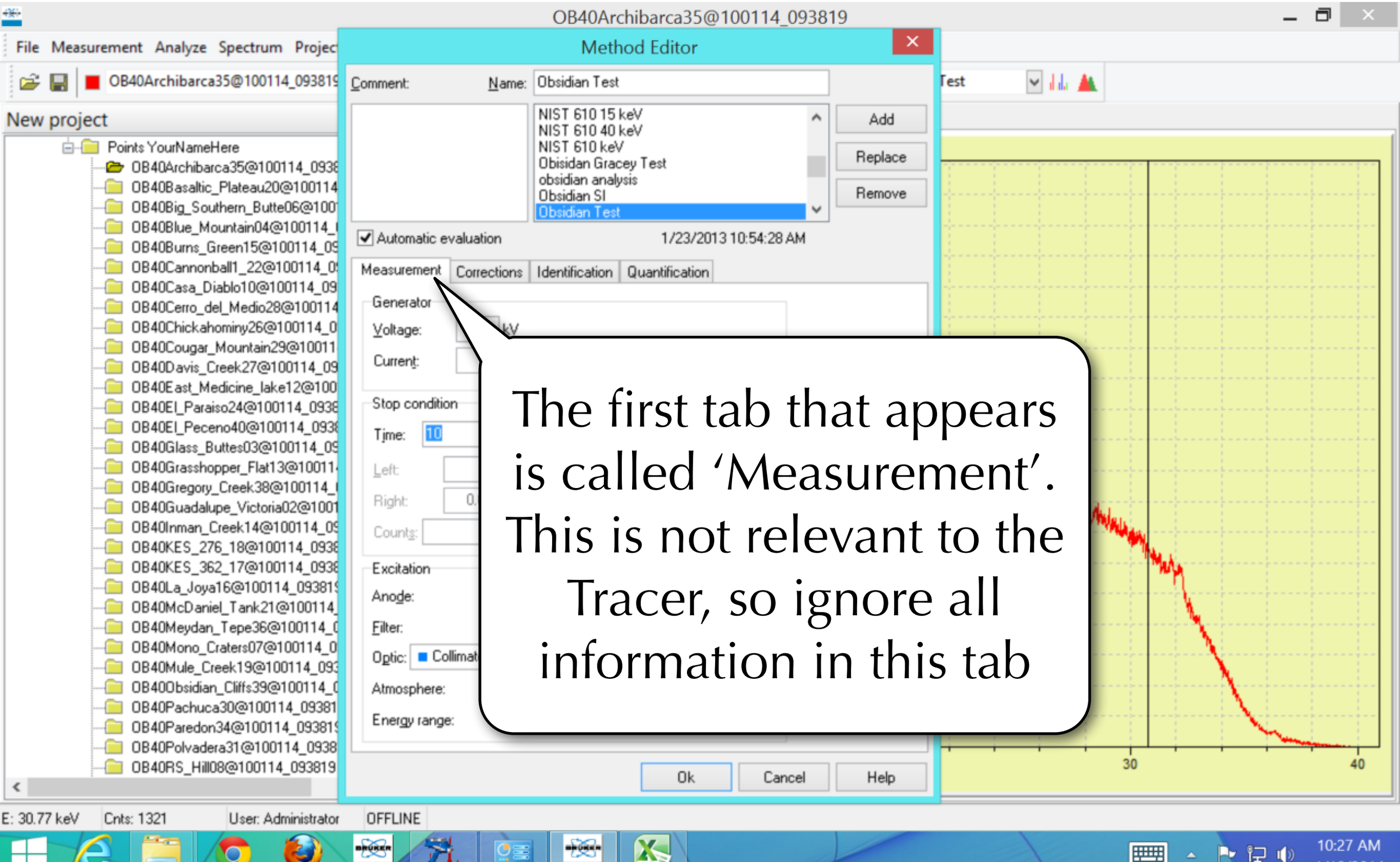
Bayesian Deconvolution



Bayesian Deconvolution



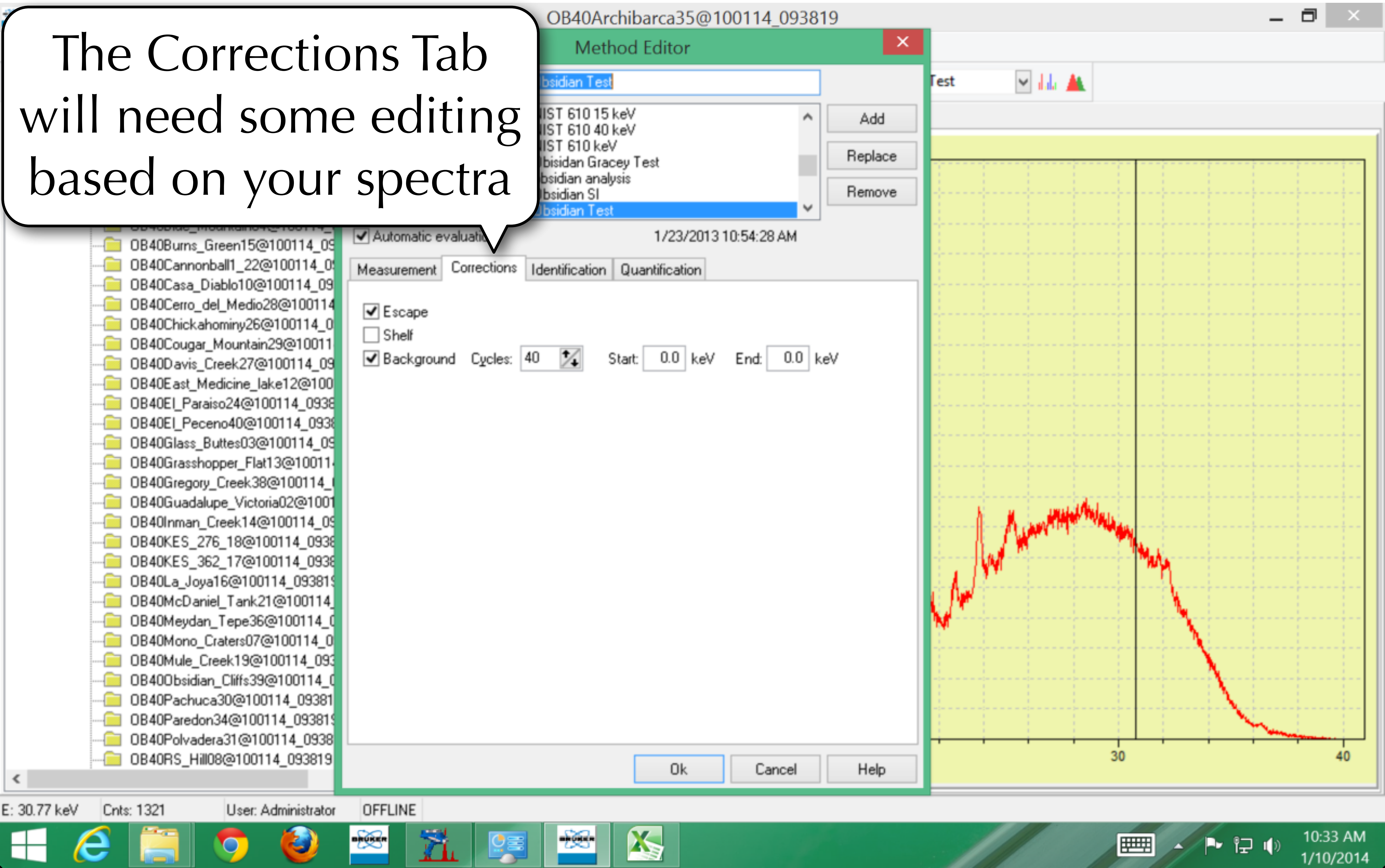
Bayesian Deconvolution



The first tab that appears is called ‘Measurement’. This is not relevant to the Tracer, so ignore all information in this tab

Bayesian Deconvolution

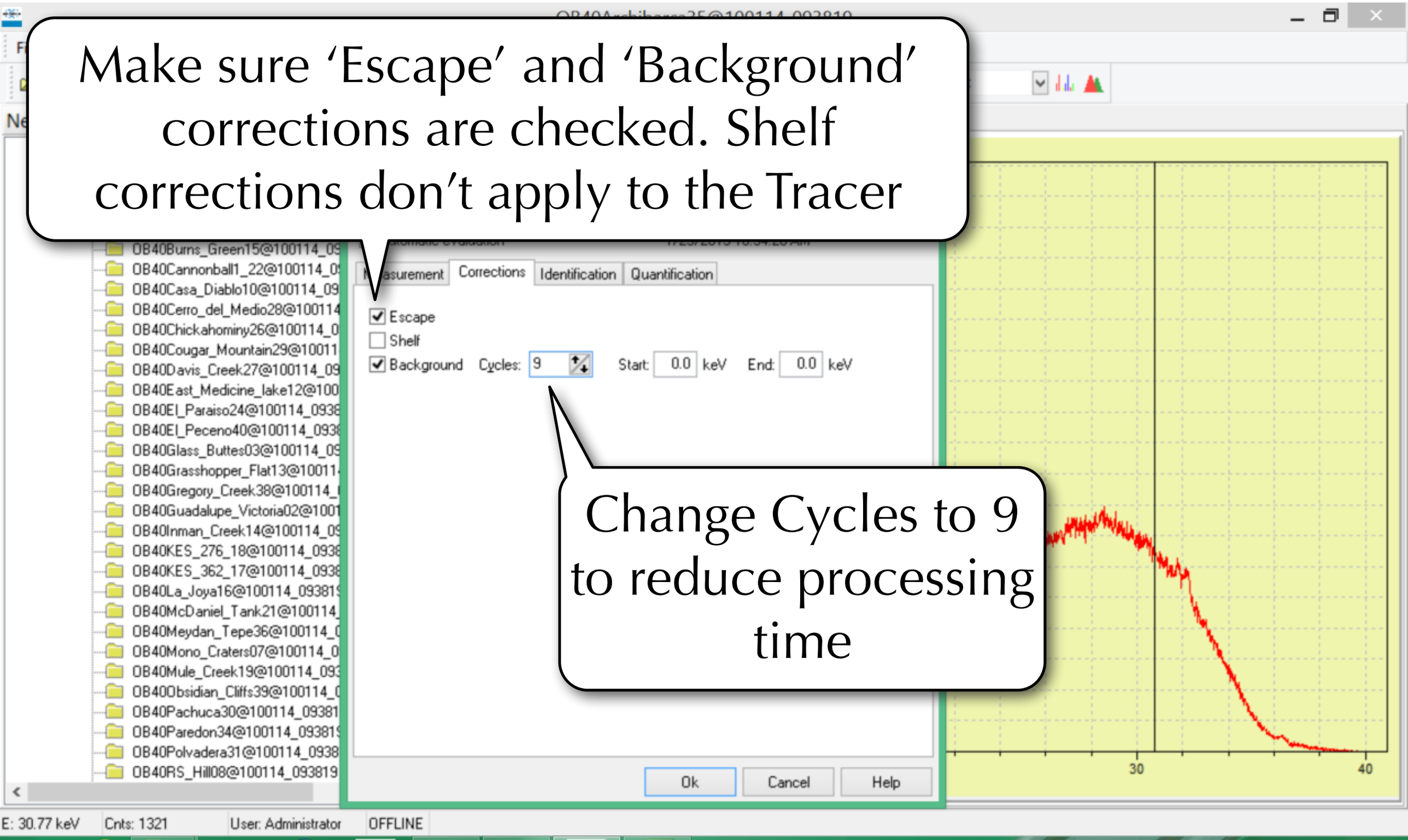
The Corrections Tab will need some editing based on your spectra



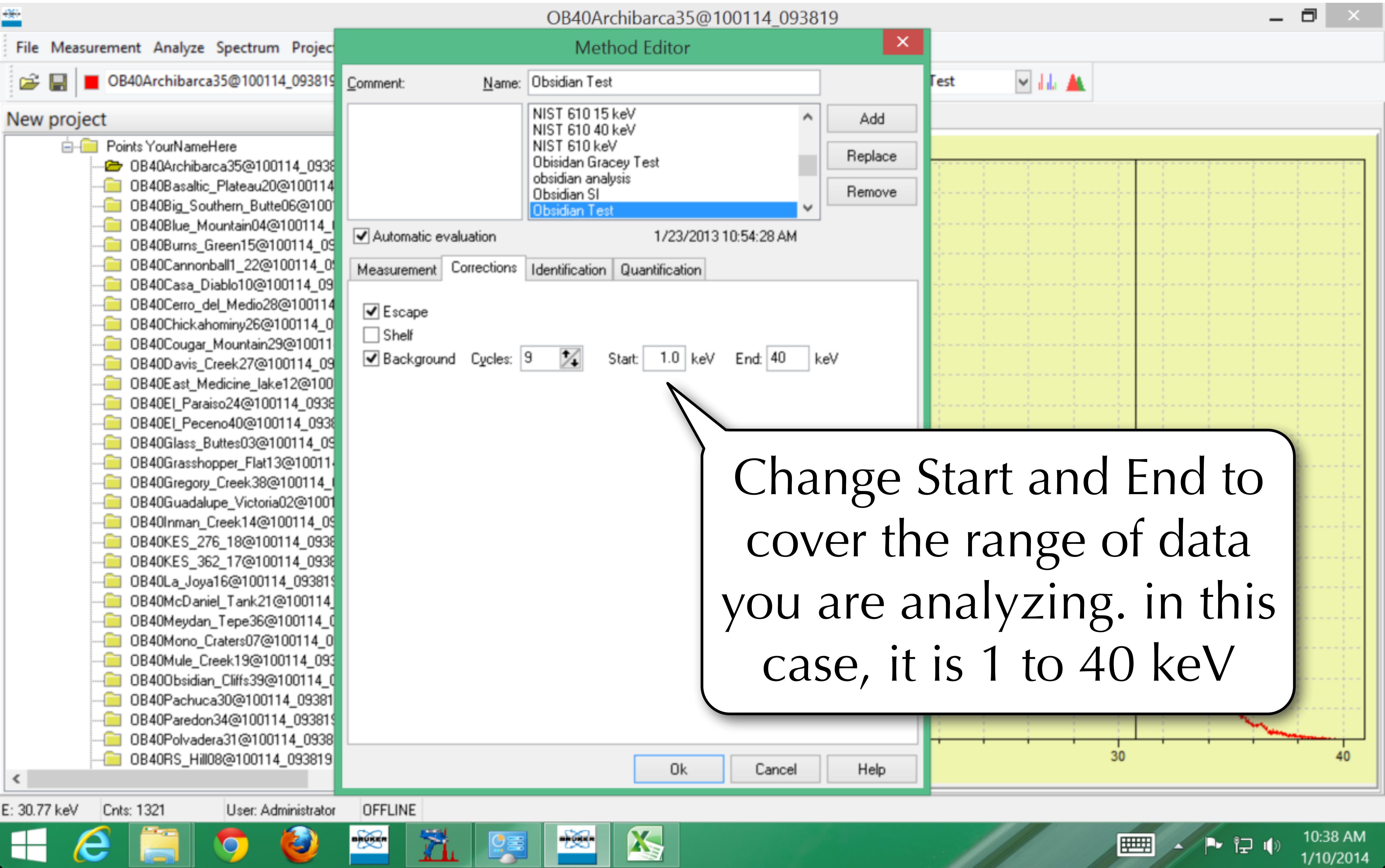
Bayesian Deconvolution

Make sure ‘Escape’ and ‘Background’ corrections are checked. Shelf corrections don’t apply to the Tracer

Change Cycles to 9 to reduce processing time



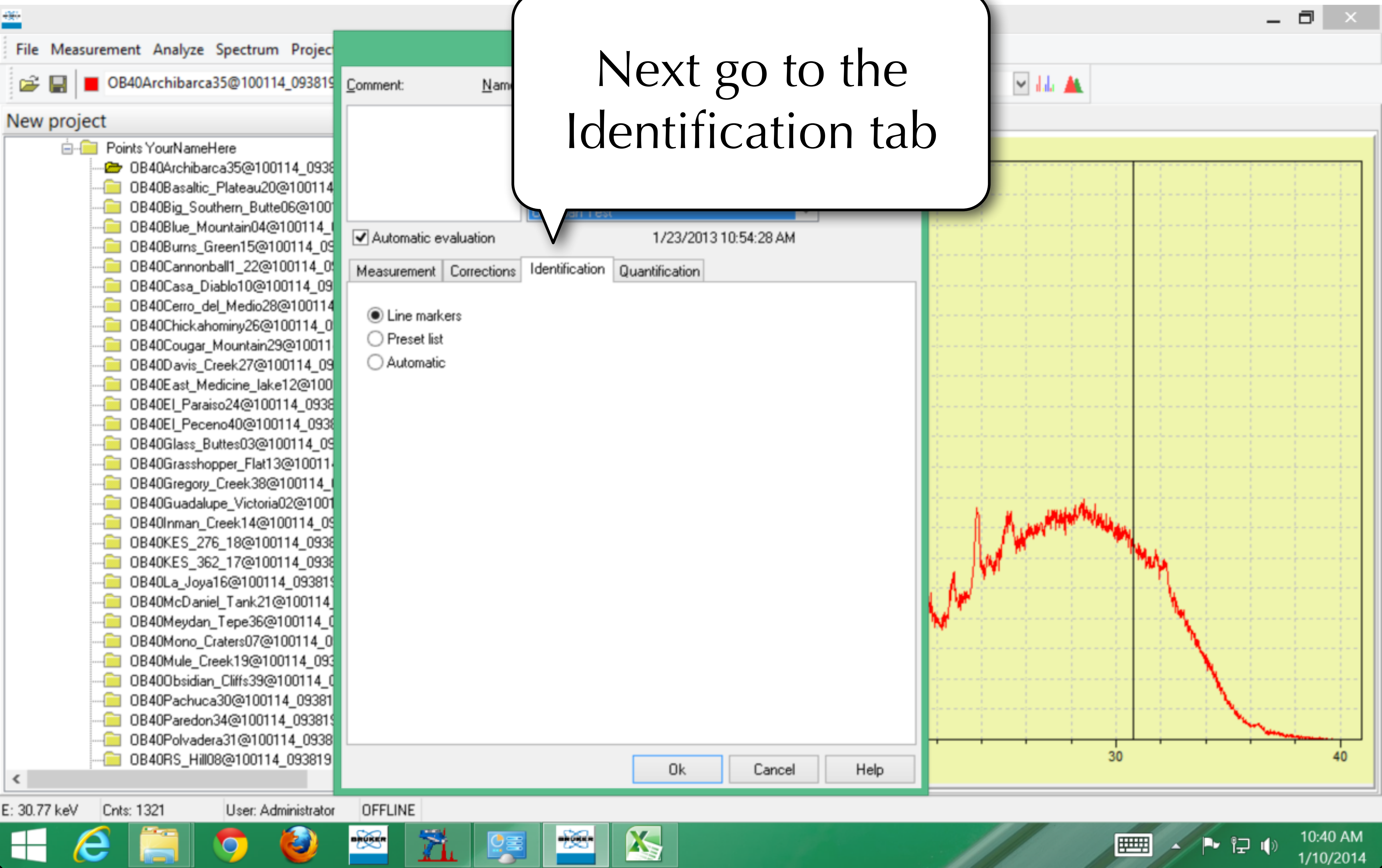
Bayesian Deconvolution



Change Start and End to cover the range of data you are analyzing. in this case, it is 1 to 40 keV

Bayesian Deconvolution

Next go to the Identification tab



Bayesian Deconvolution

Select ‘Preset List’

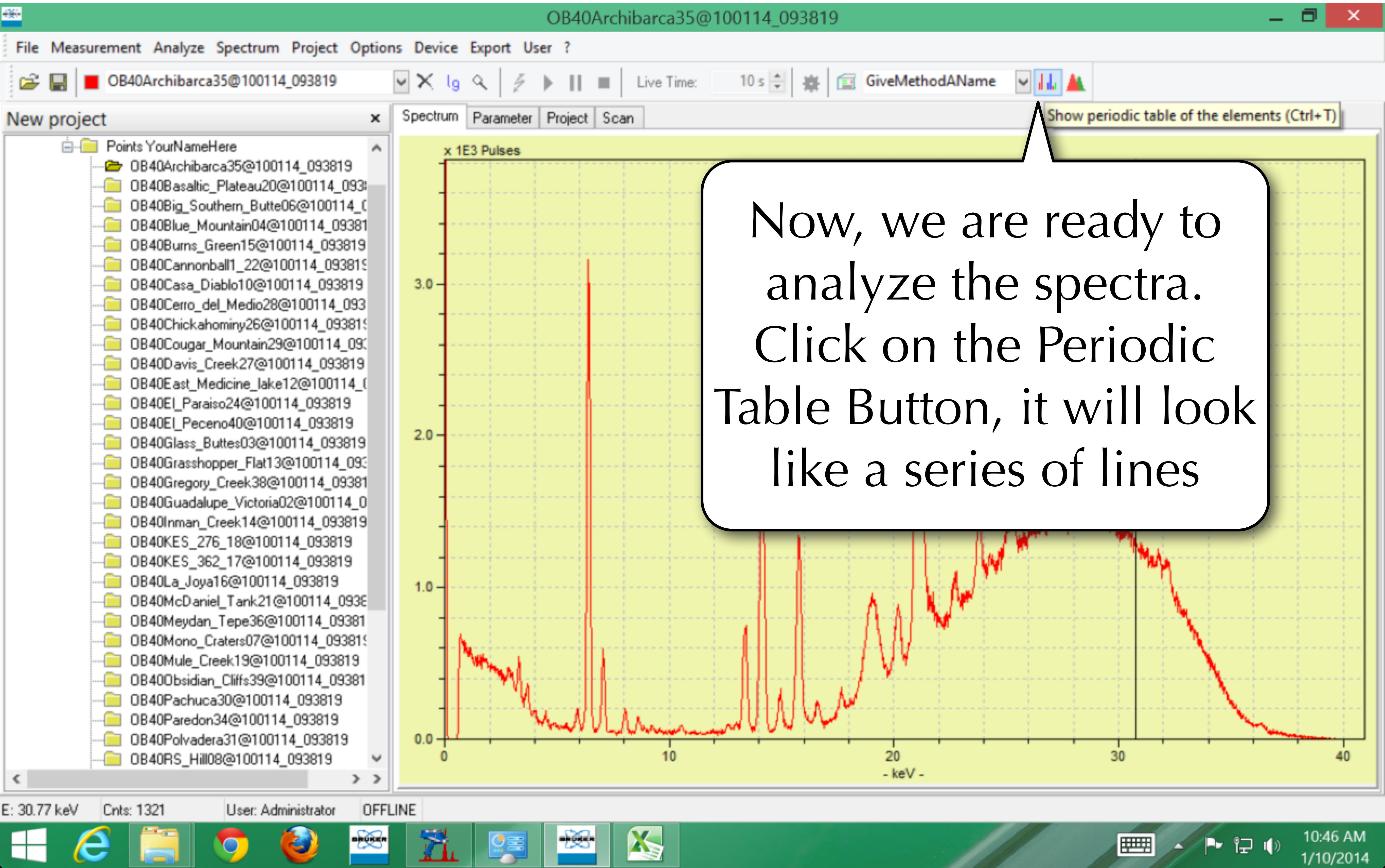
A Periodic Table will appear

Bayesian Deconvolution

Next, enter a name for the method you have created

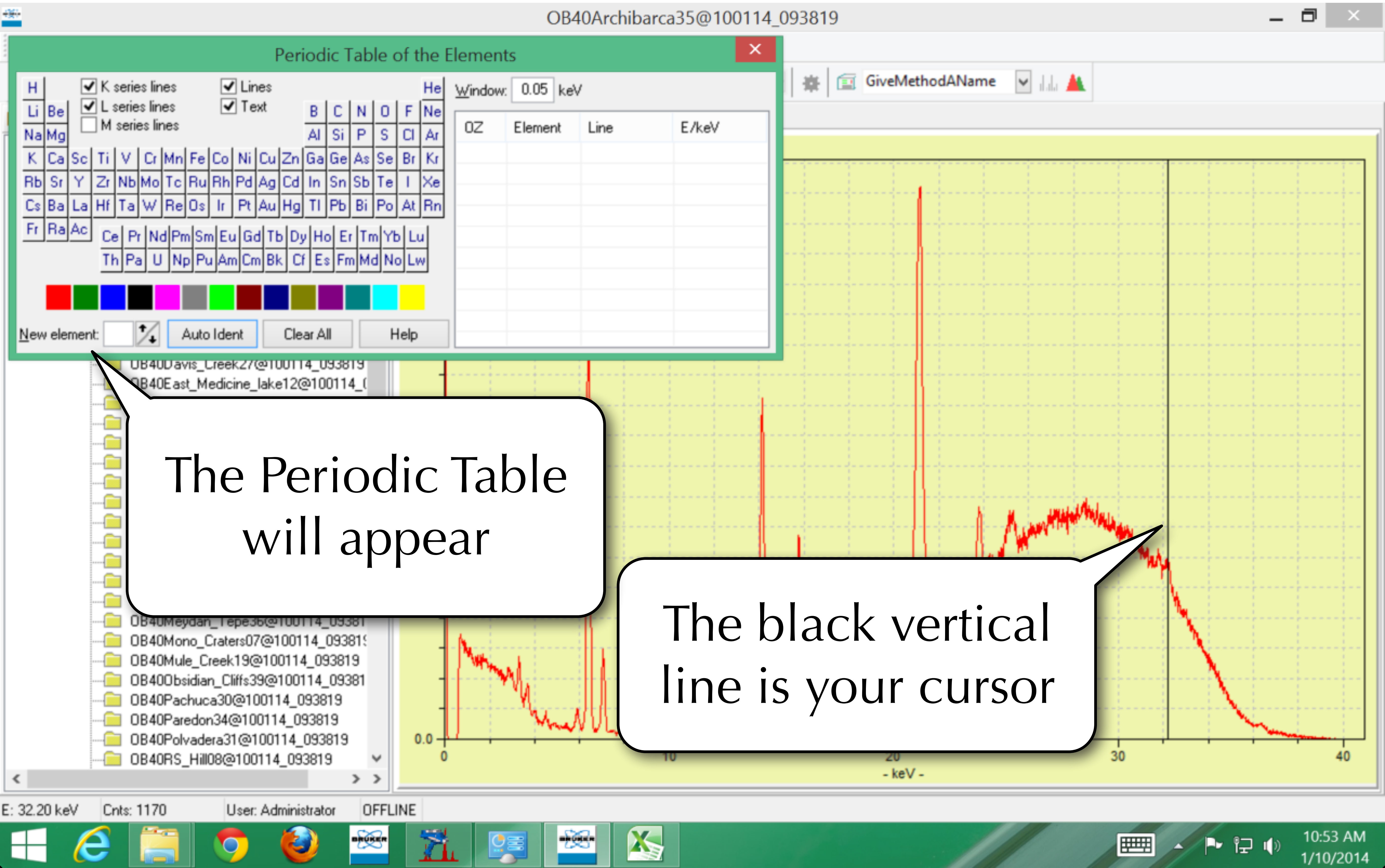
Click ‘Add’ to include it in available methods for Artax

Bayesian Deconvolution



Now, we are ready to analyze the spectra. Click on the Periodic Table Button, it will look like a series of lines

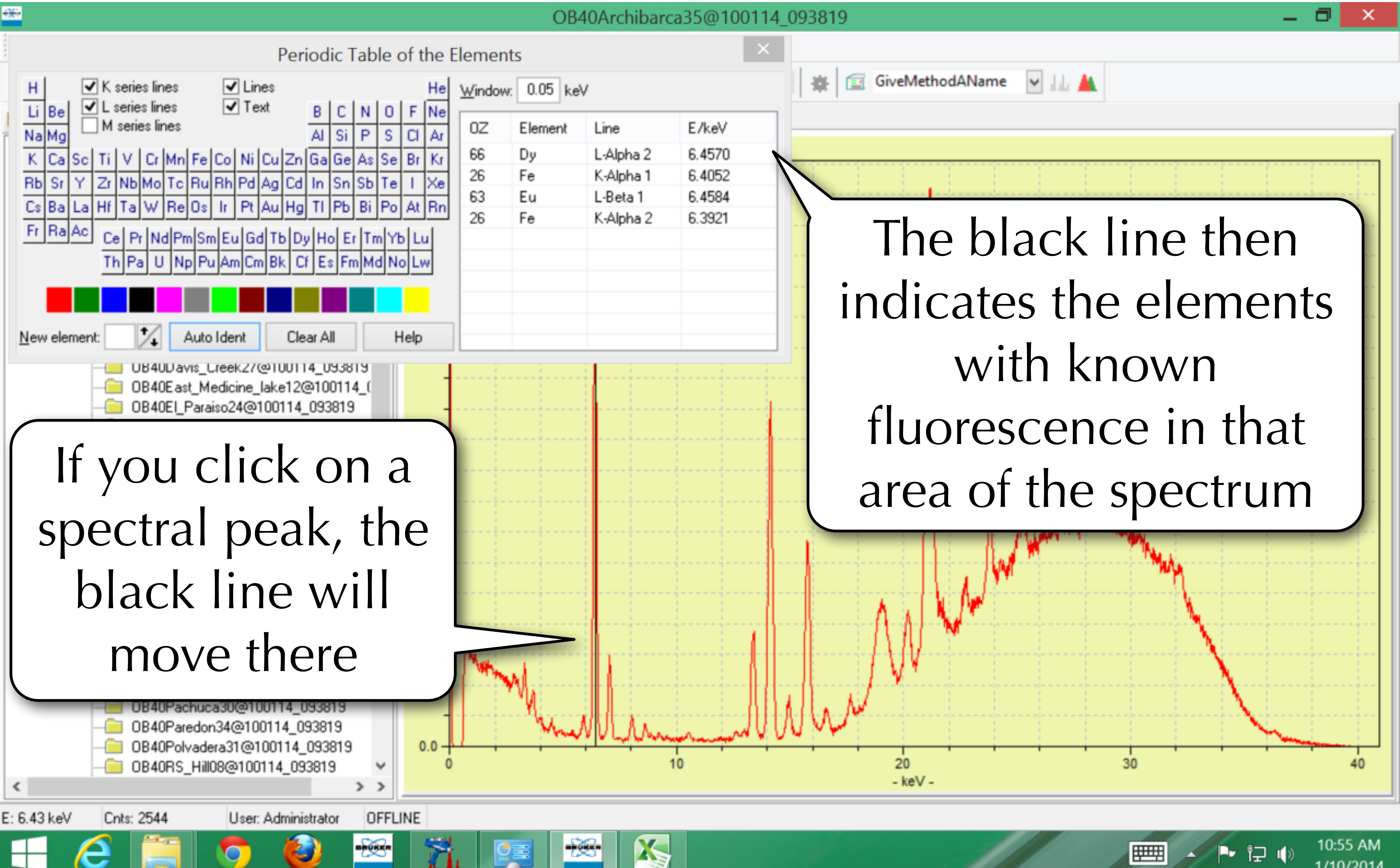
Bayesian Deconvolution



The Periodic Table will appear

The black vertical line is your cursor

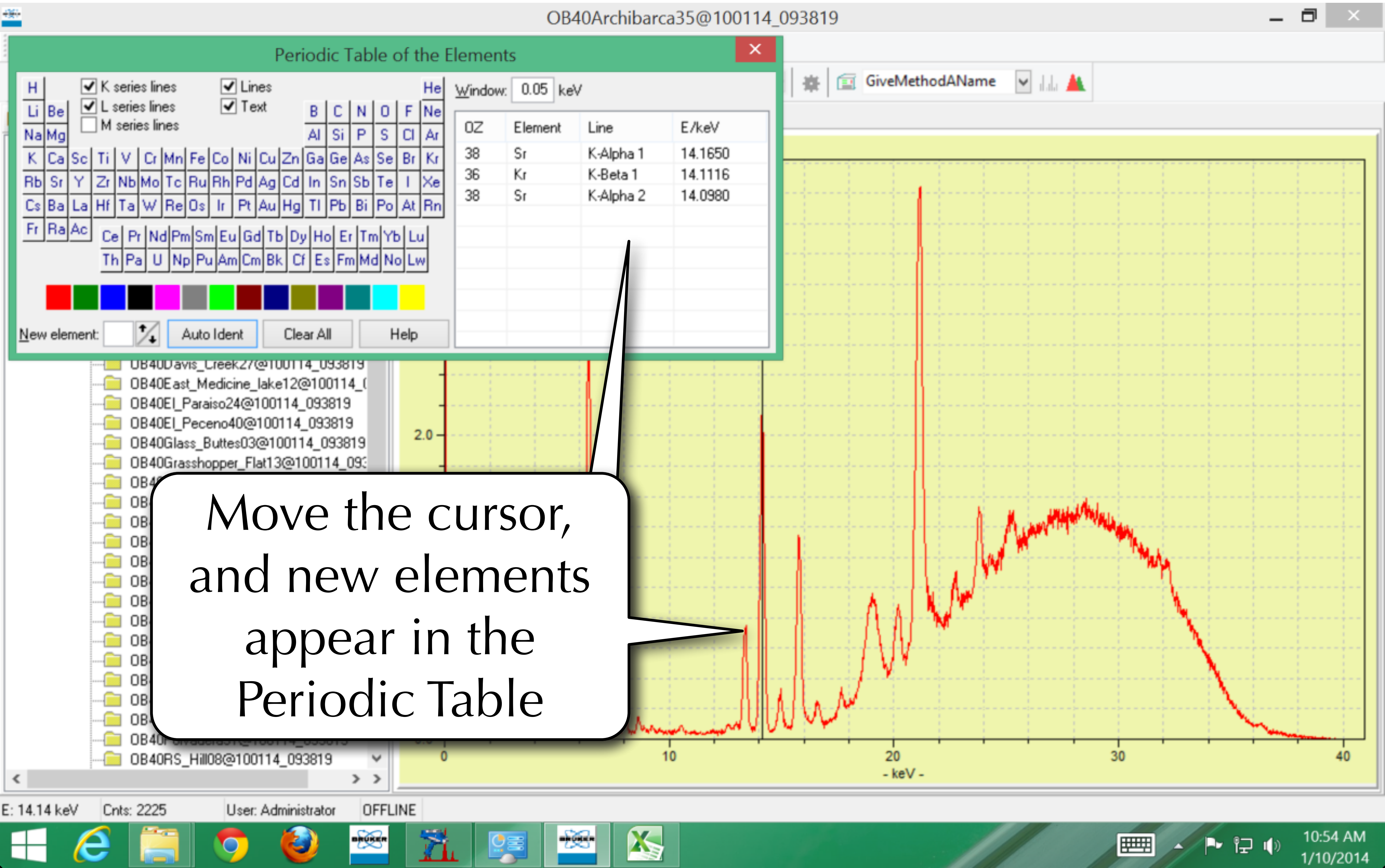
Bayesian Deconvolution



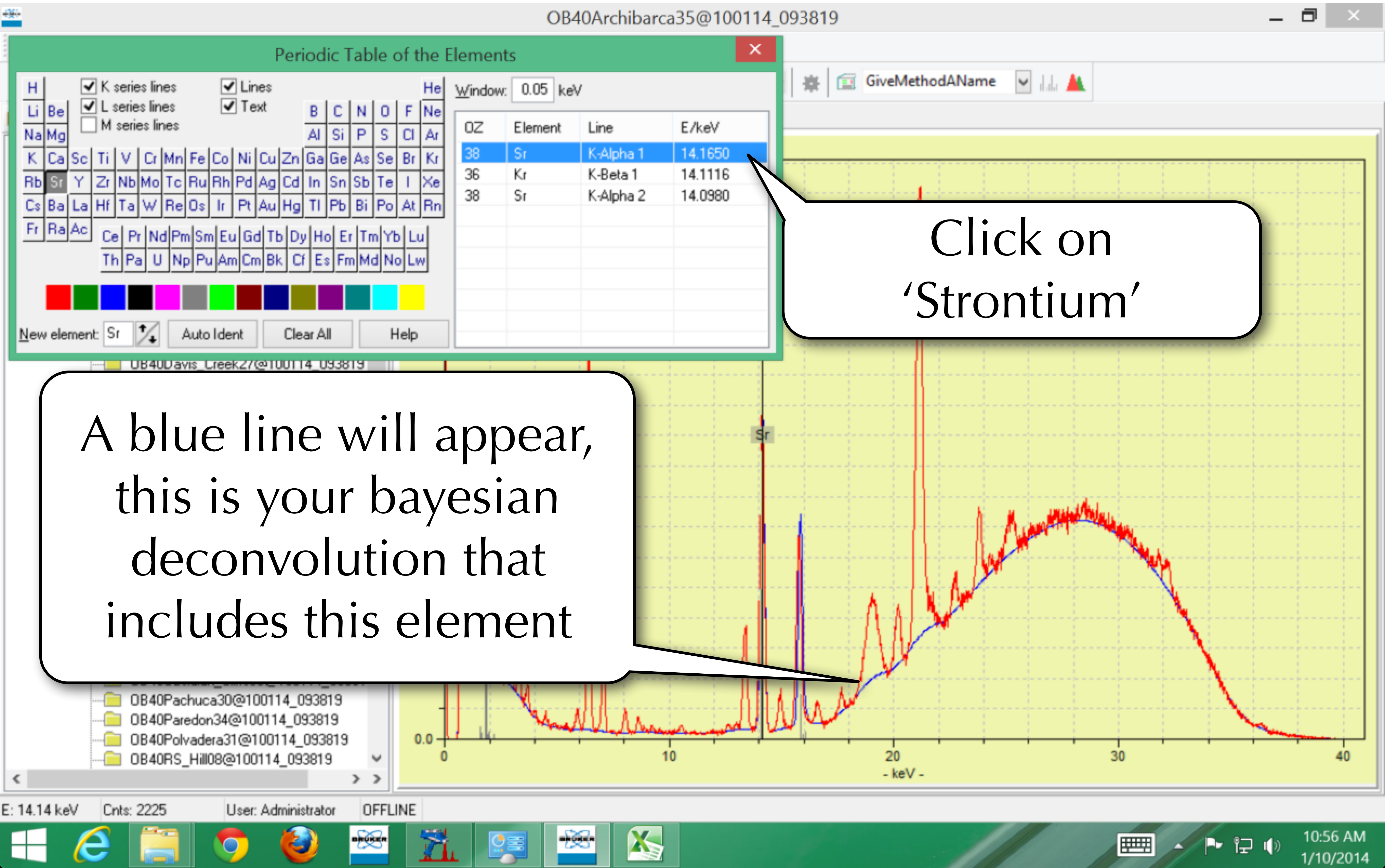
The black line then indicates the elements with known fluorescence in that area of the spectrum

If you click on a spectral peak, the black line will move there

Bayesian Deconvolution



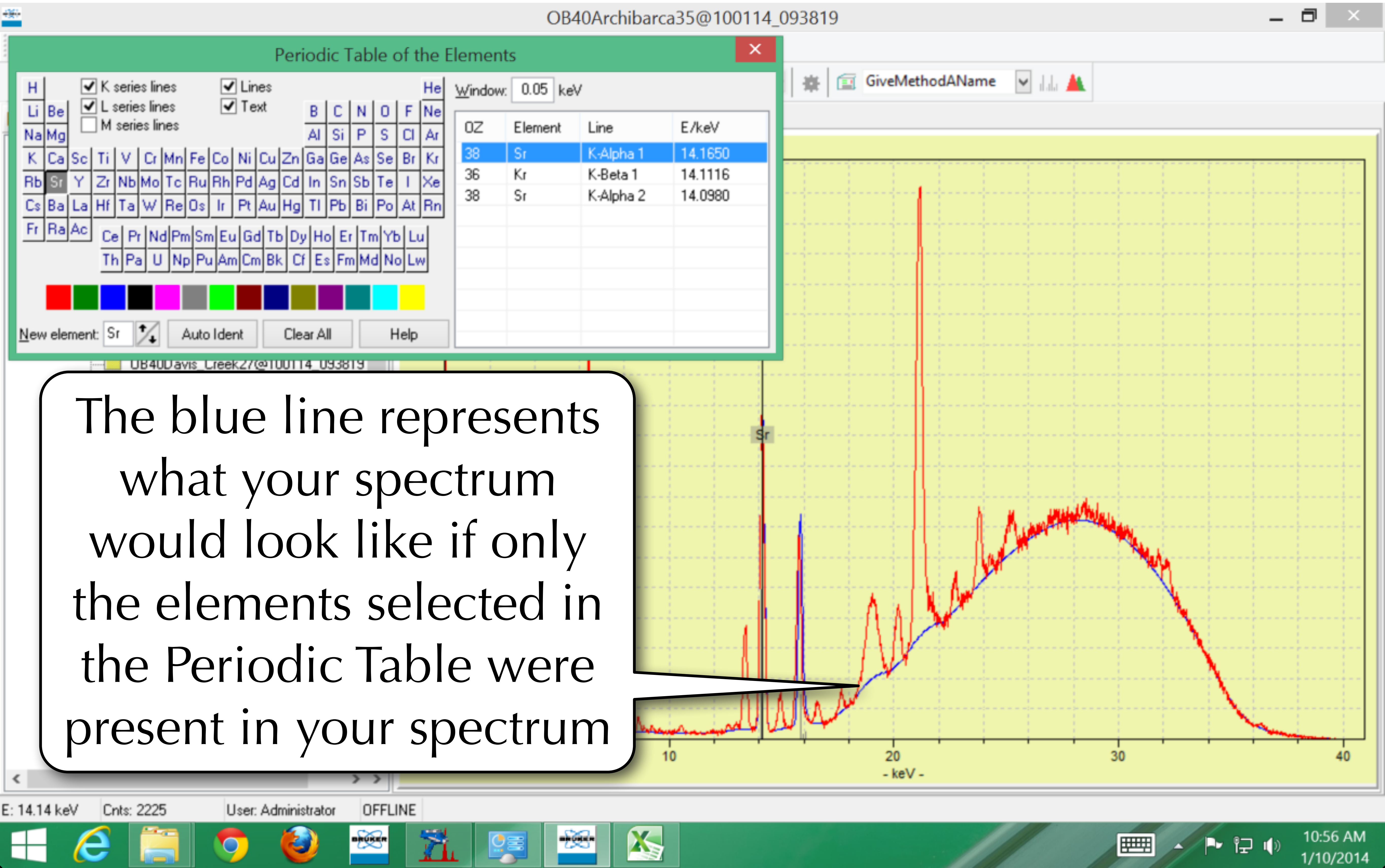
Bayesian Deconvolution



Click on ‘Strontium’

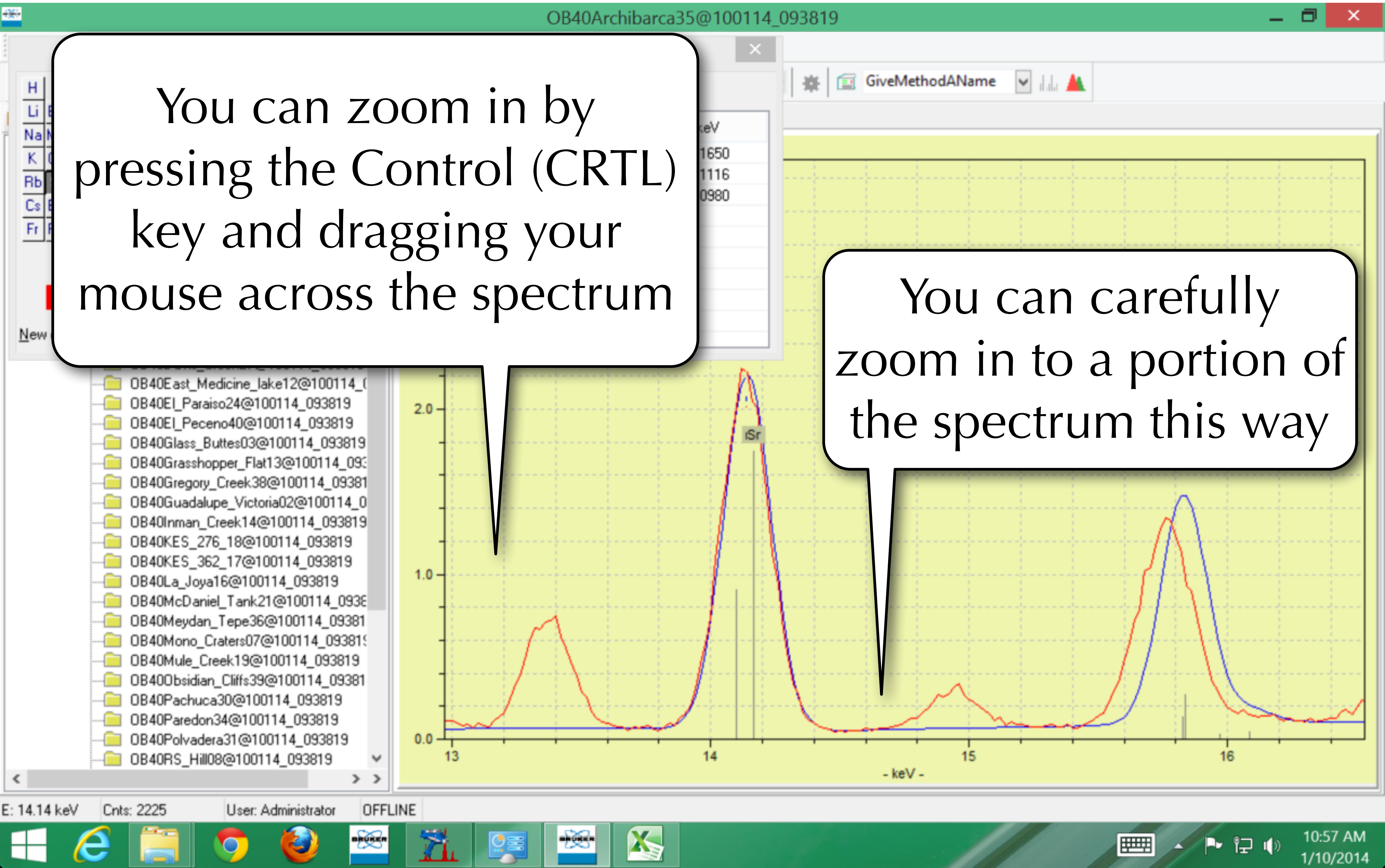
A blue line will appear, this is your bayesian deconvolution that includes this element

Bayesian Deconvolution

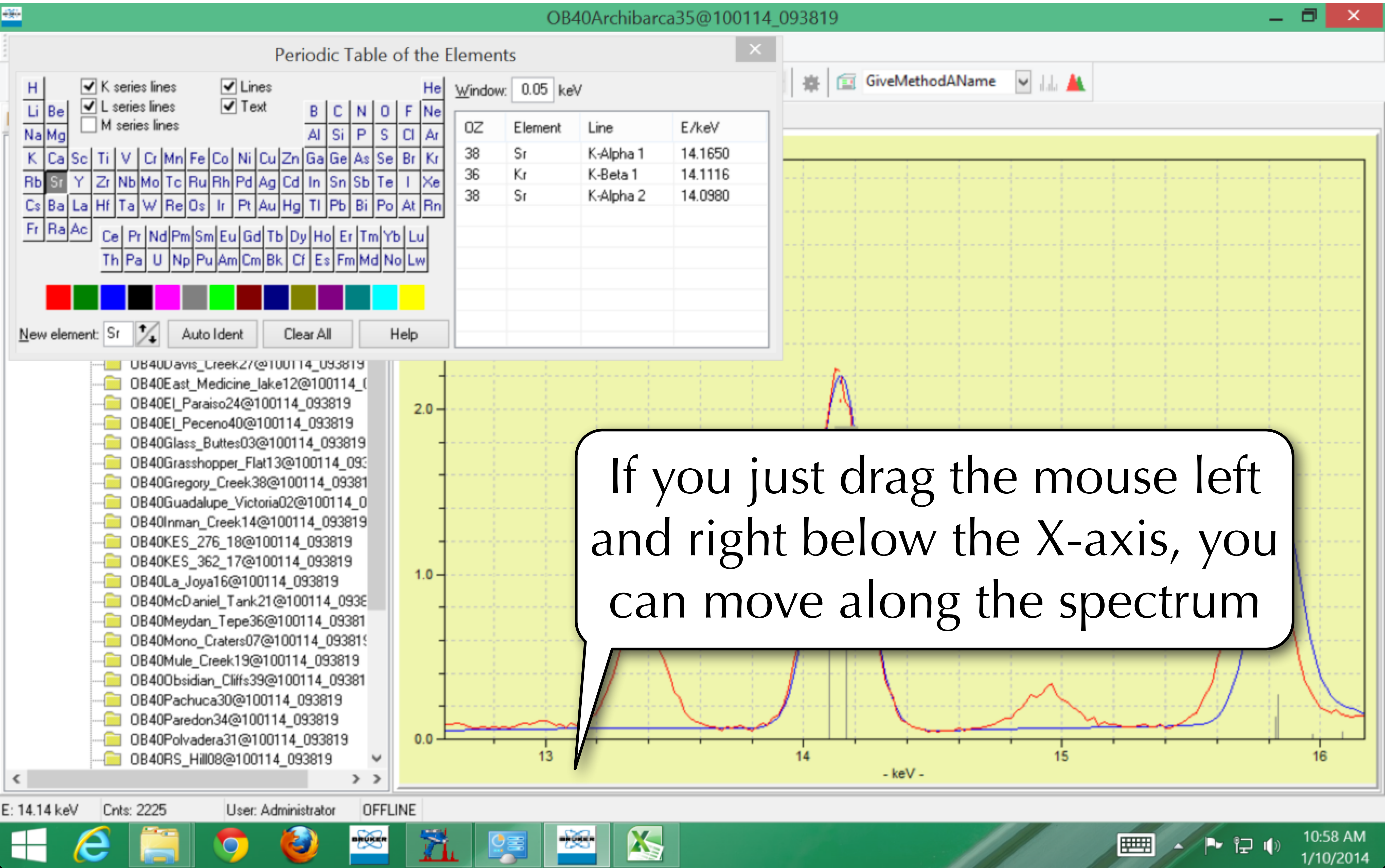


The blue line represents what your spectrum would look like if only the elements selected in the Periodic Table were present in your spectrum

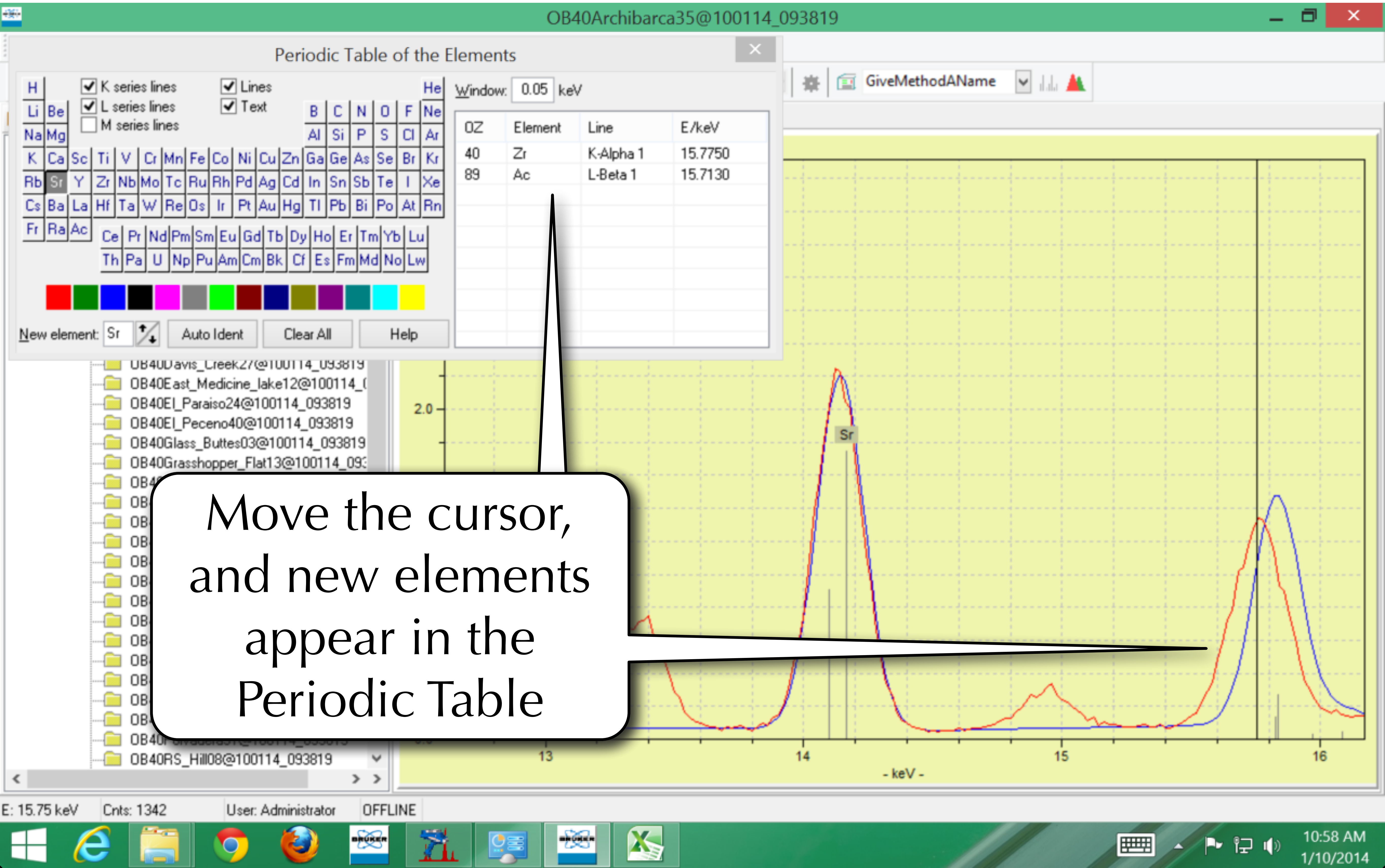
Bayesian Deconvolution



Bayesian Deconvolution

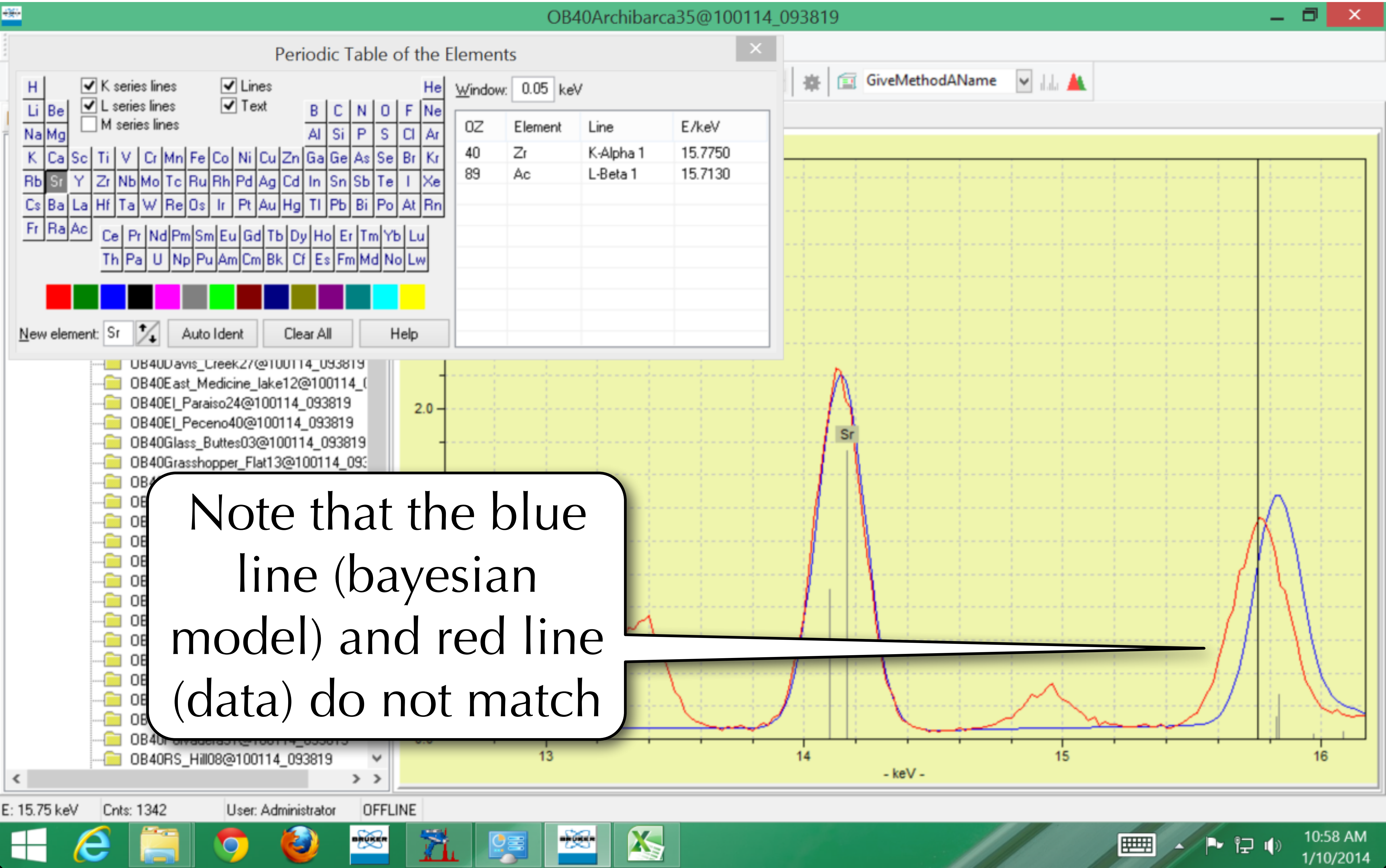


Bayesian Deconvolution



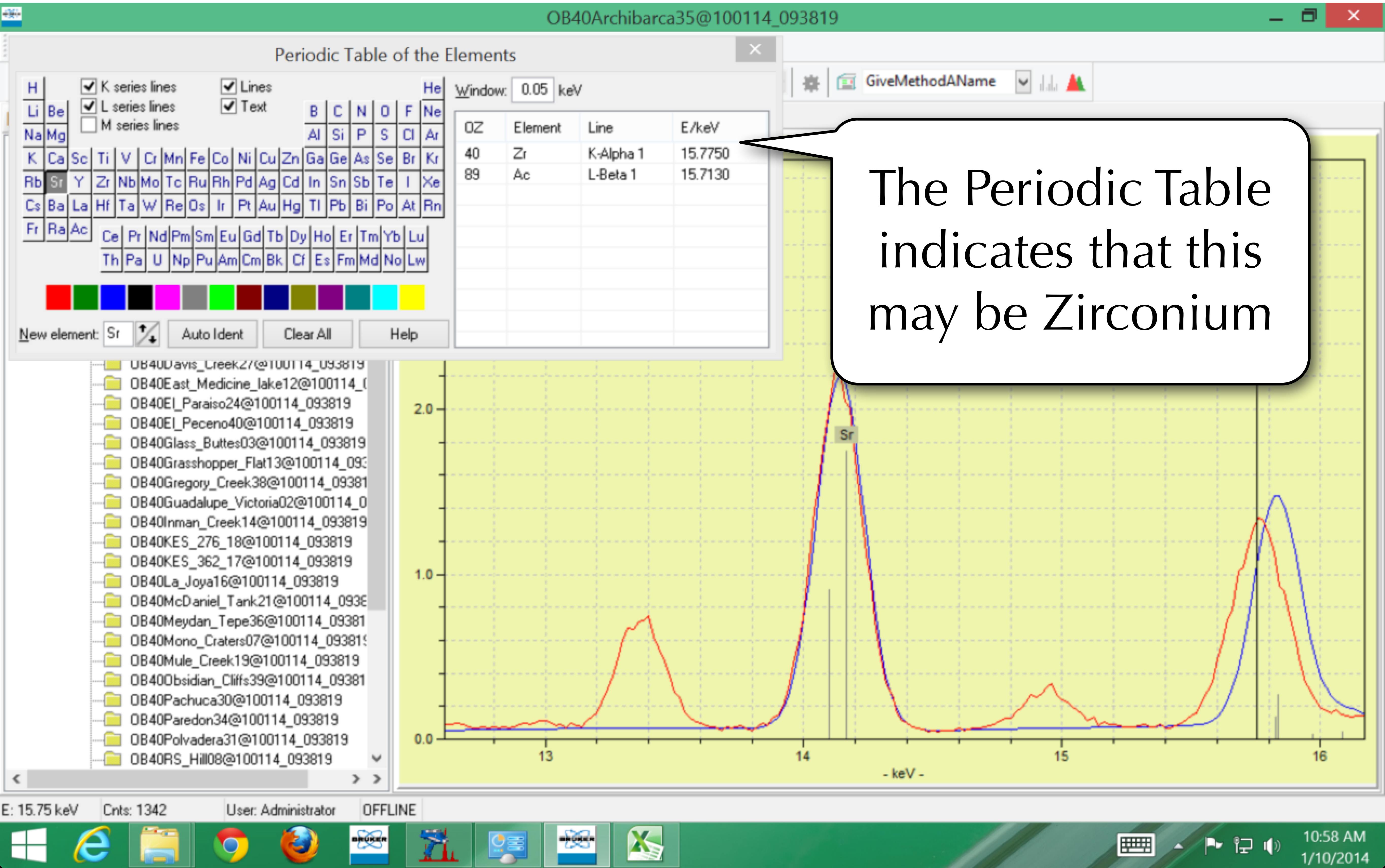
Move the cursor, and new elements appear in the Periodic Table

Bayesian Deconvolution



Note that the blue line (bayesian model) and red line (data) do not match

Bayesian Deconvolution



Bayesian Deconvolution

OB40Archibarca35@100114_093819

Periodic Table of the Elements

K series lines · L series lines · M series lines · Lines · Text

Window: 0.05 keV

OZ	Element	Line	E/keV
40	Zr	K-Alpha 1	15.7750
89	Ac	L-Beta 1	15.7130

New element: Zr

Zirconium can be clicked in the Periodic Table

GiveMethodAName

Sr

Zr

1.0

0.0

13

14

15

16

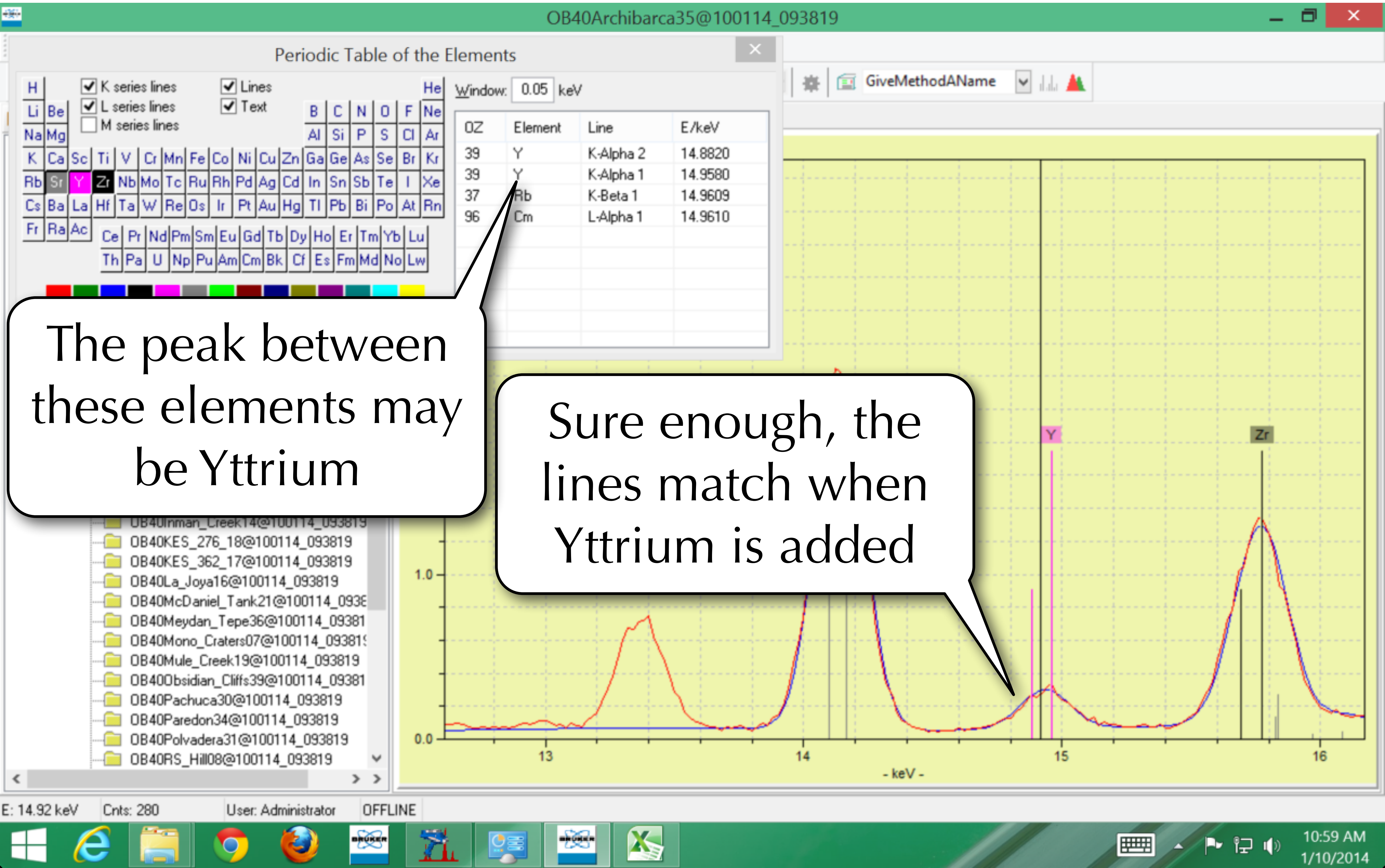
- keV -

And now the blue bayesian deconvolution and your data match

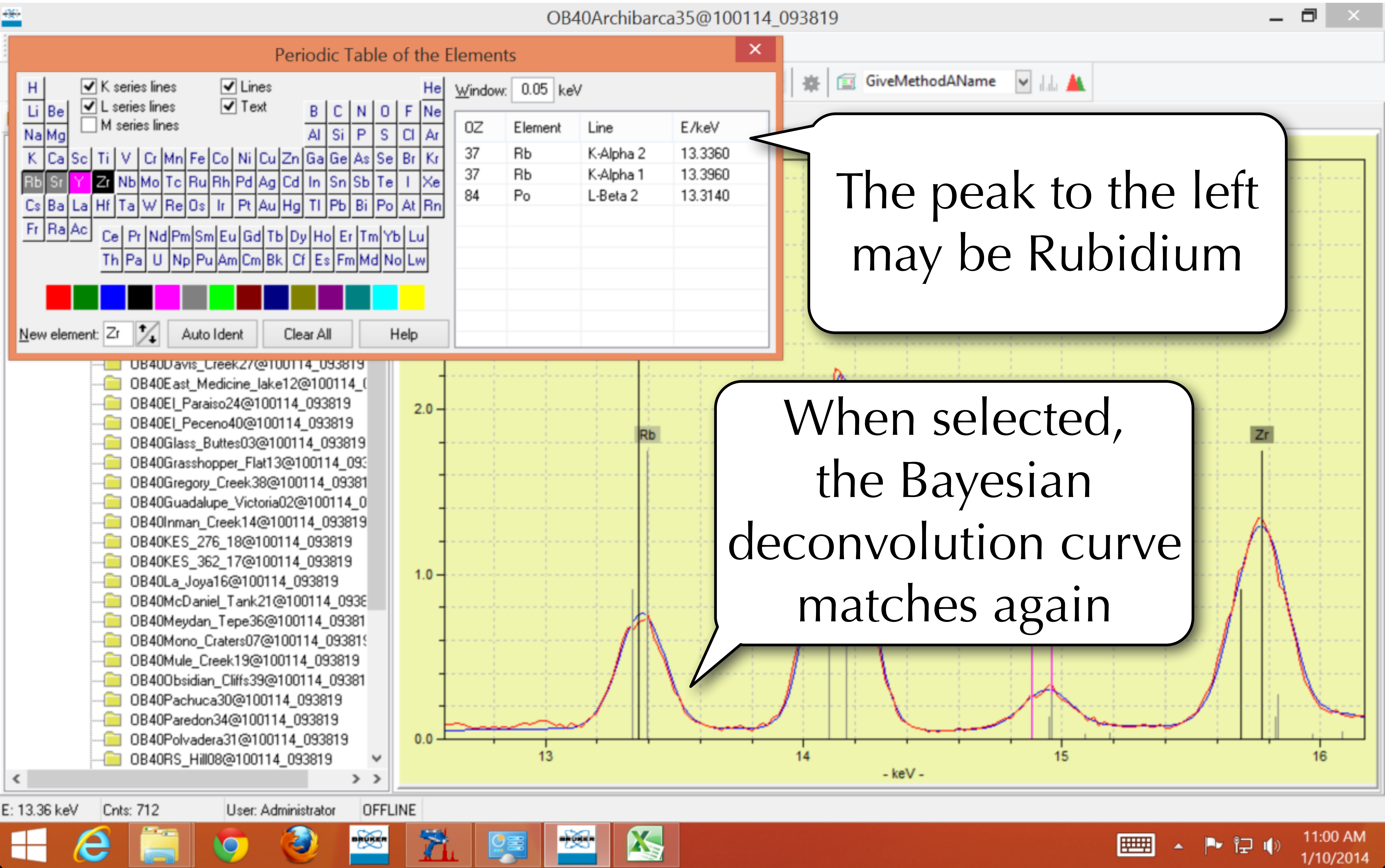
E: 15.75 keV | Cnts: 1342 | User: Administrator | OFFLINE

10:59 AM
1/10/2014

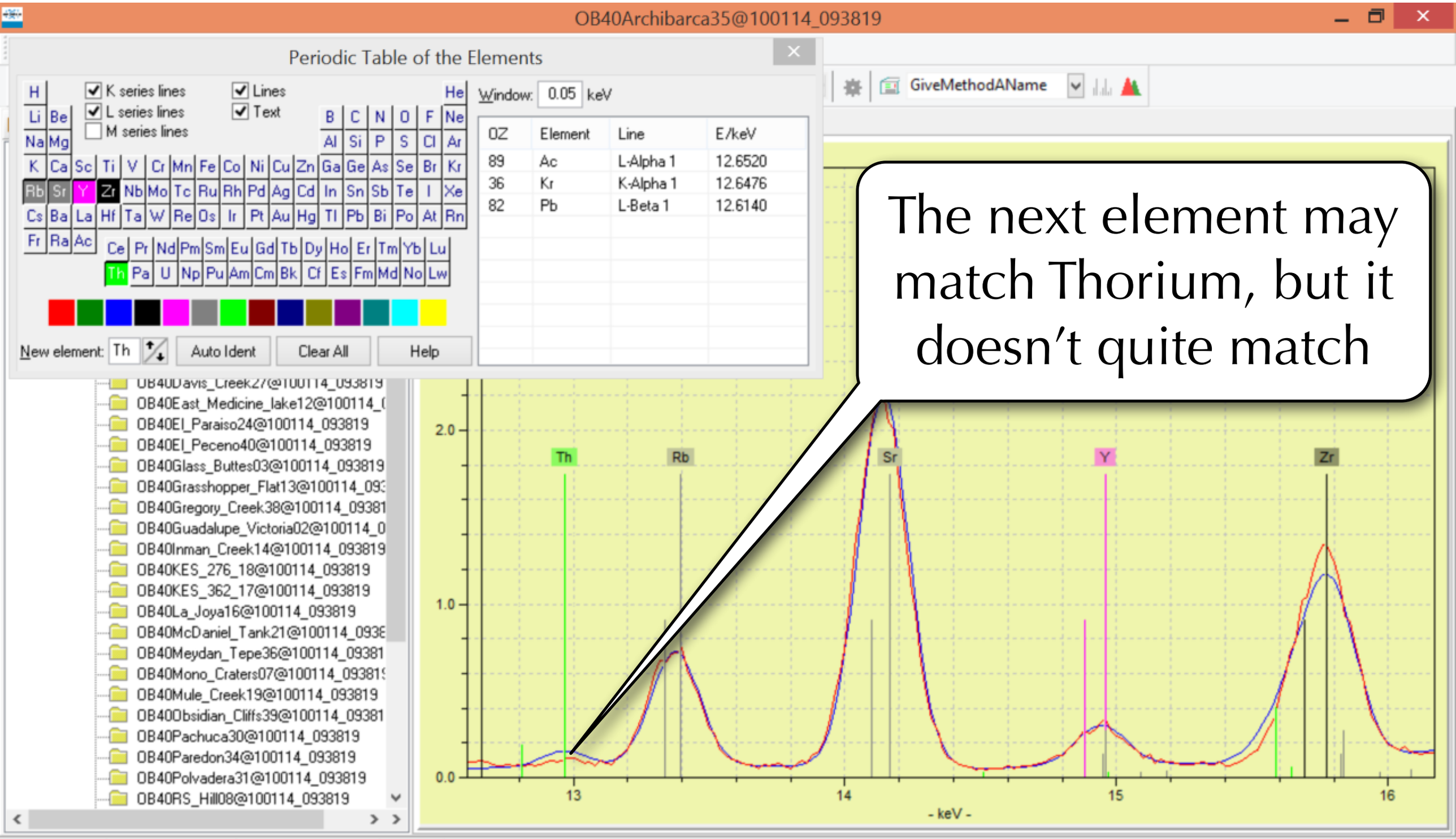
Bayesian Deconvolution



Bayesian Deconvolution

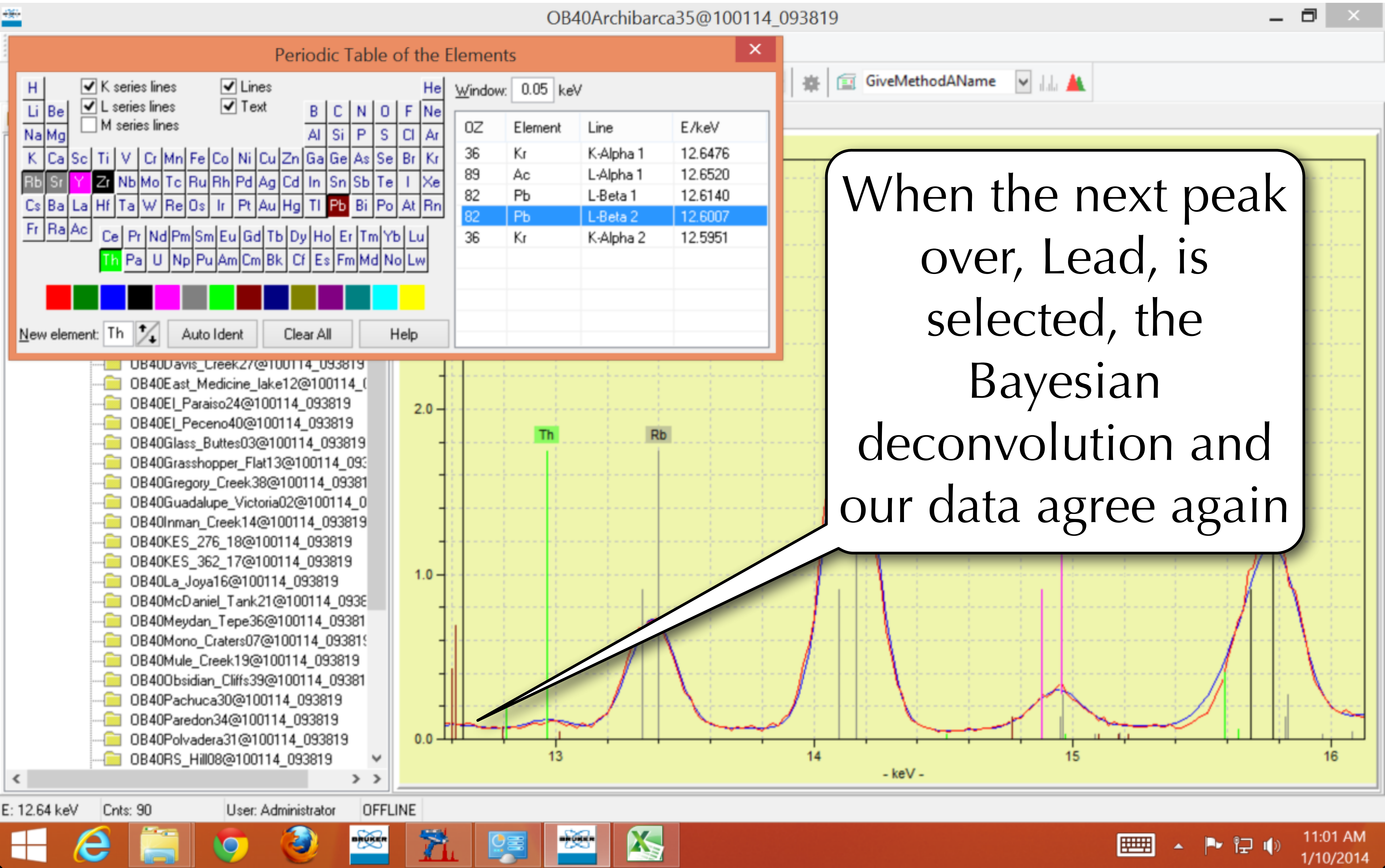


Bayesian Deconvolution



The next element may match Thorium, but it doesn't quite match

Bayesian Deconvolution

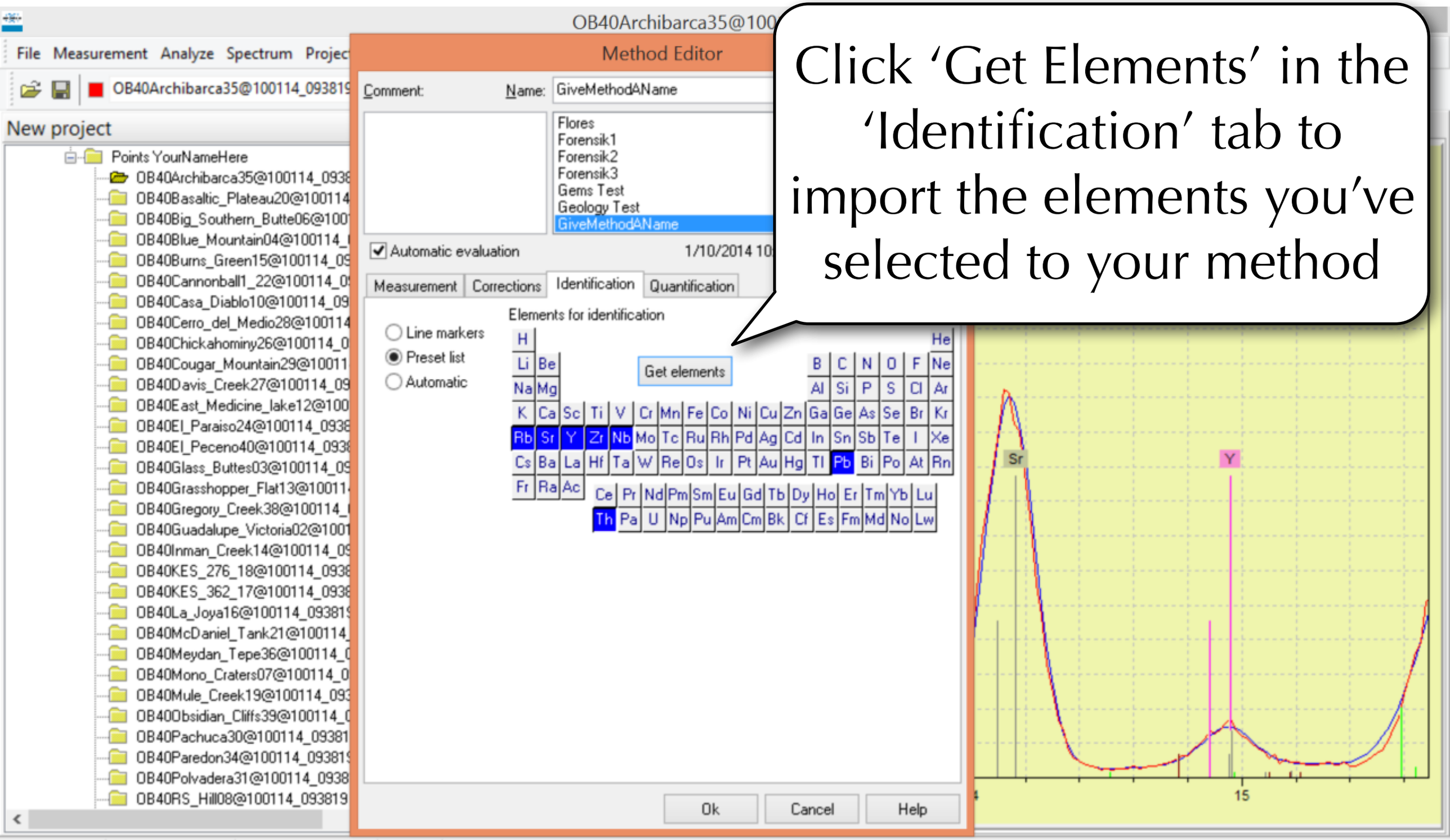


When the next peak over, Lead, is selected, the Bayesian deconvolution and our data agree again

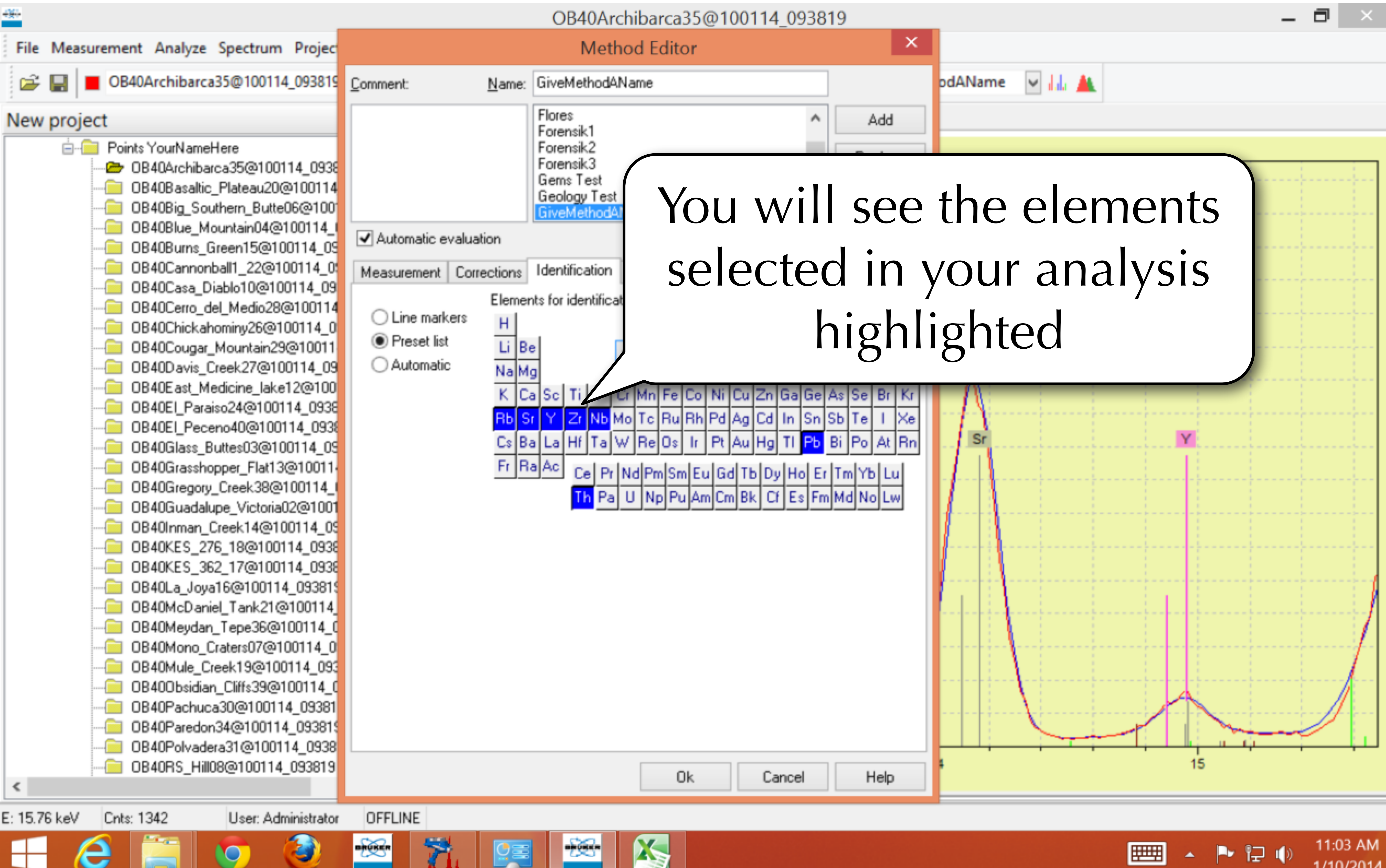
Bayesian Deconvolution

When you have gotten a first set of elements, go back to the Method Editor

Bayesian Deconvolution

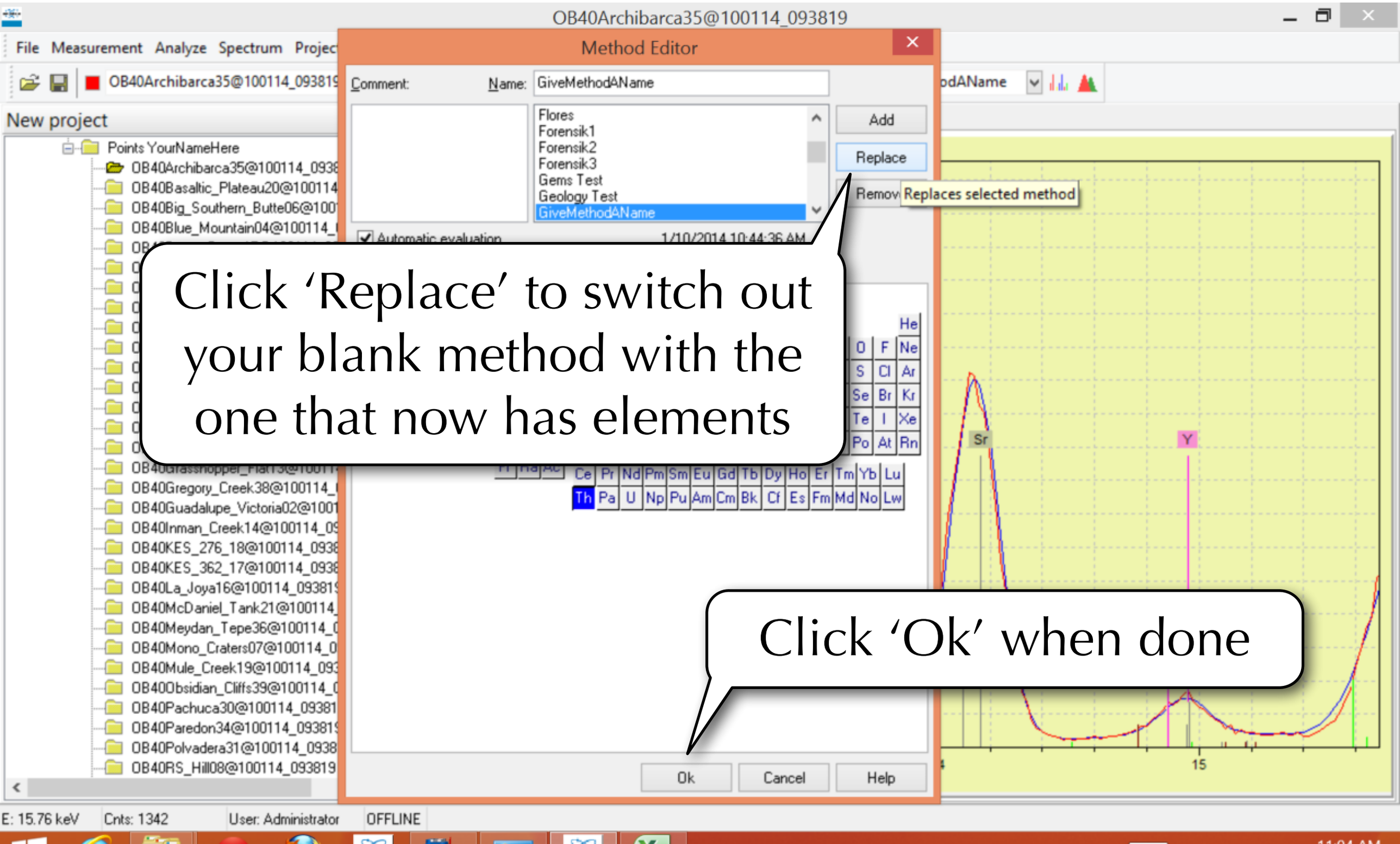


Bayesian Deconvolution



You will see the elements selected in your analysis highlighted

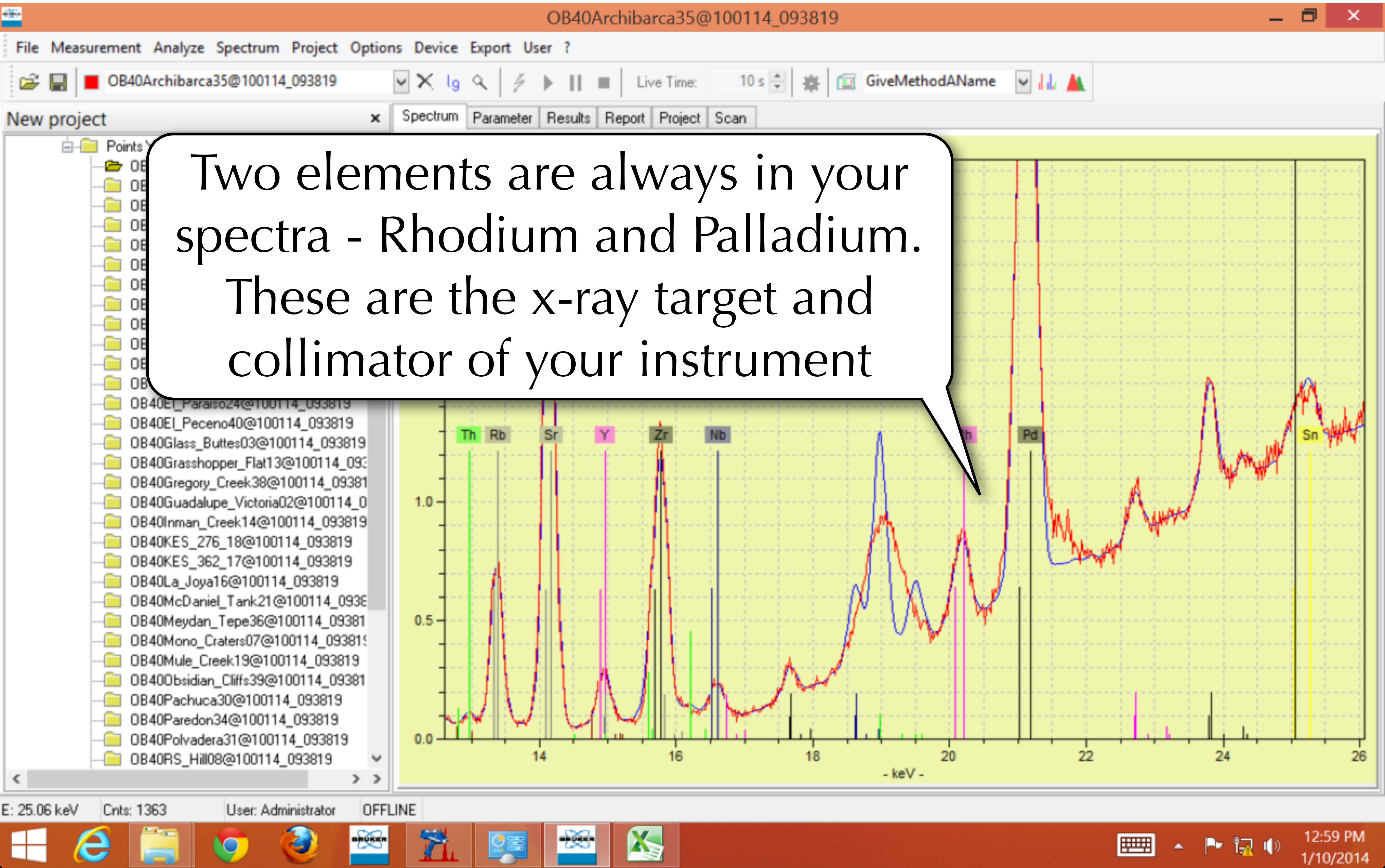
Bayesian Deconvolution



Click ‘Replace’ to switch out your blank method with the one that now has elements

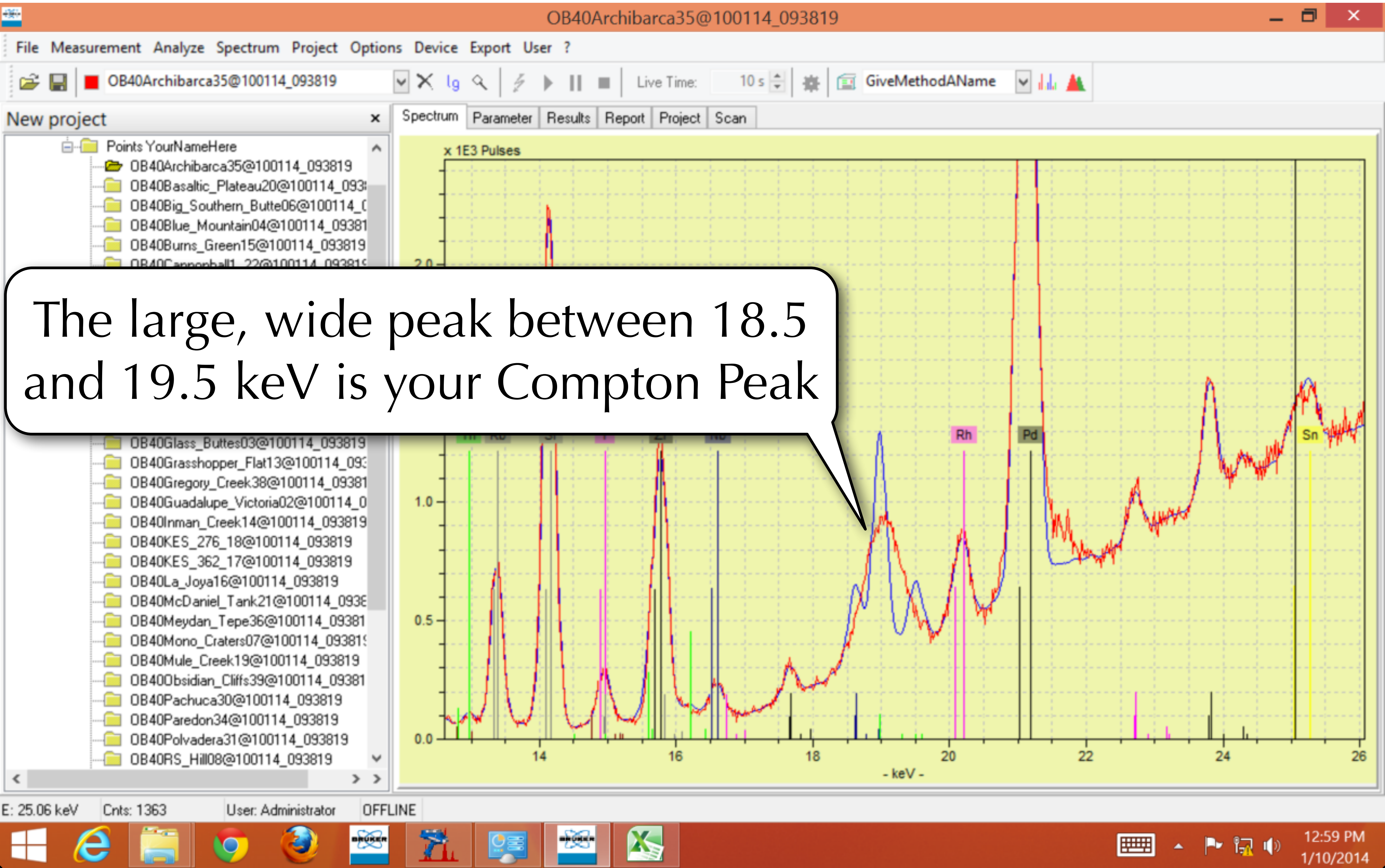
Click ‘Ok’ when done

Bayesian Deconvolution



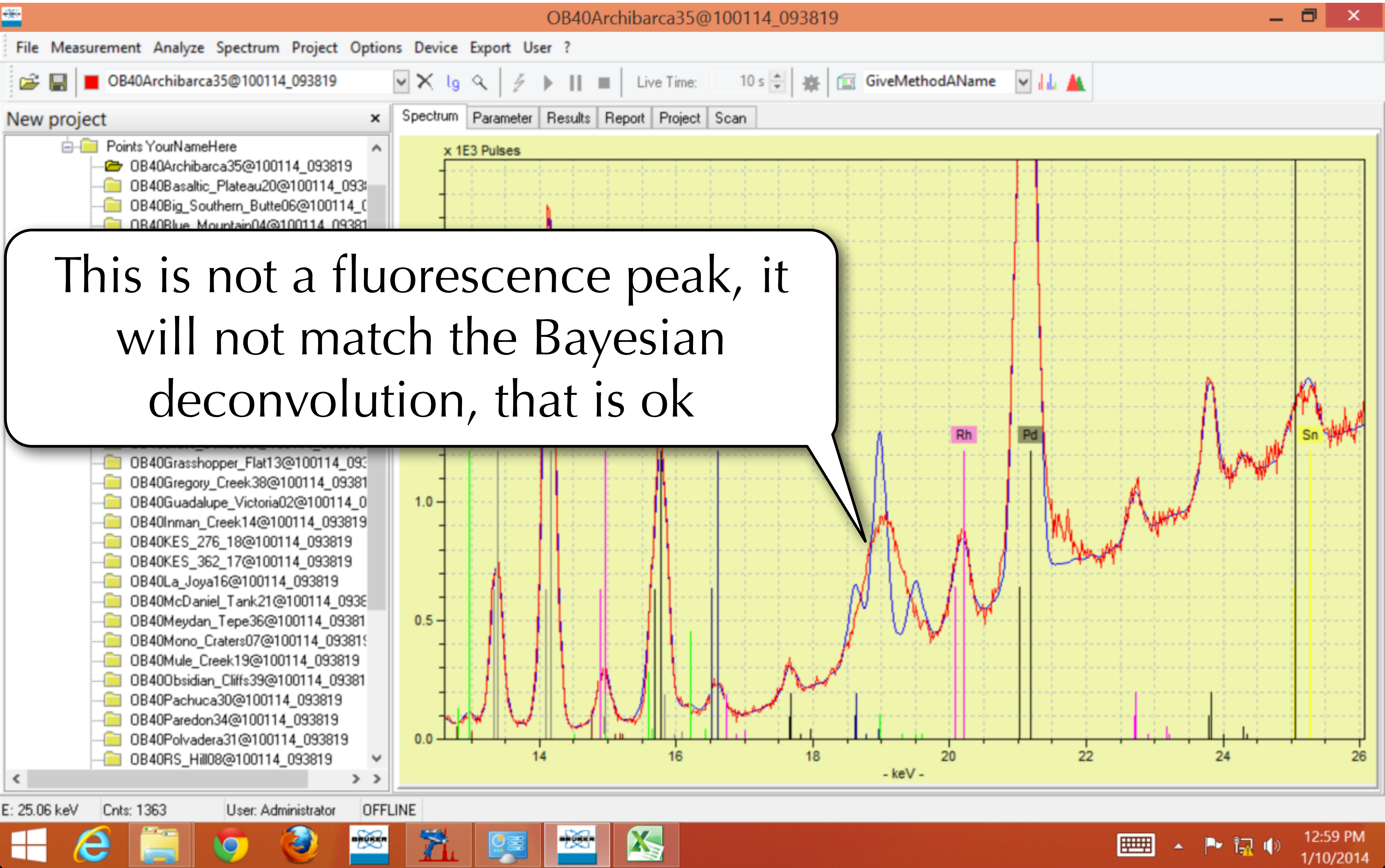
Two elements are always in your spectra - Rhodium and Palladium. These are the x-ray target and collimator of your instrument

Bayesian Deconvolution



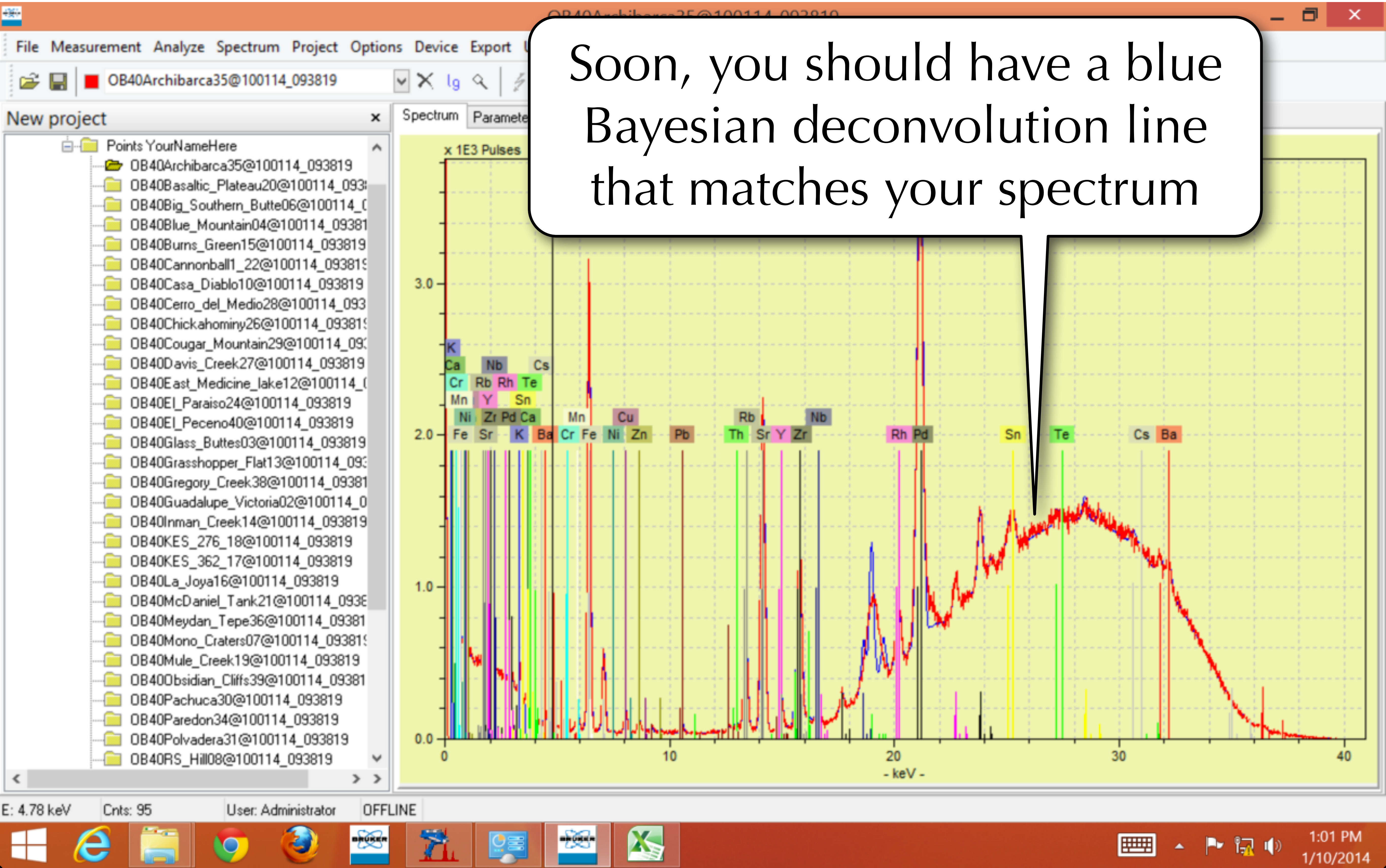
The large, wide peak between 18.5 and 19.5 keV is your Compton Peak

Bayesian Deconvolution



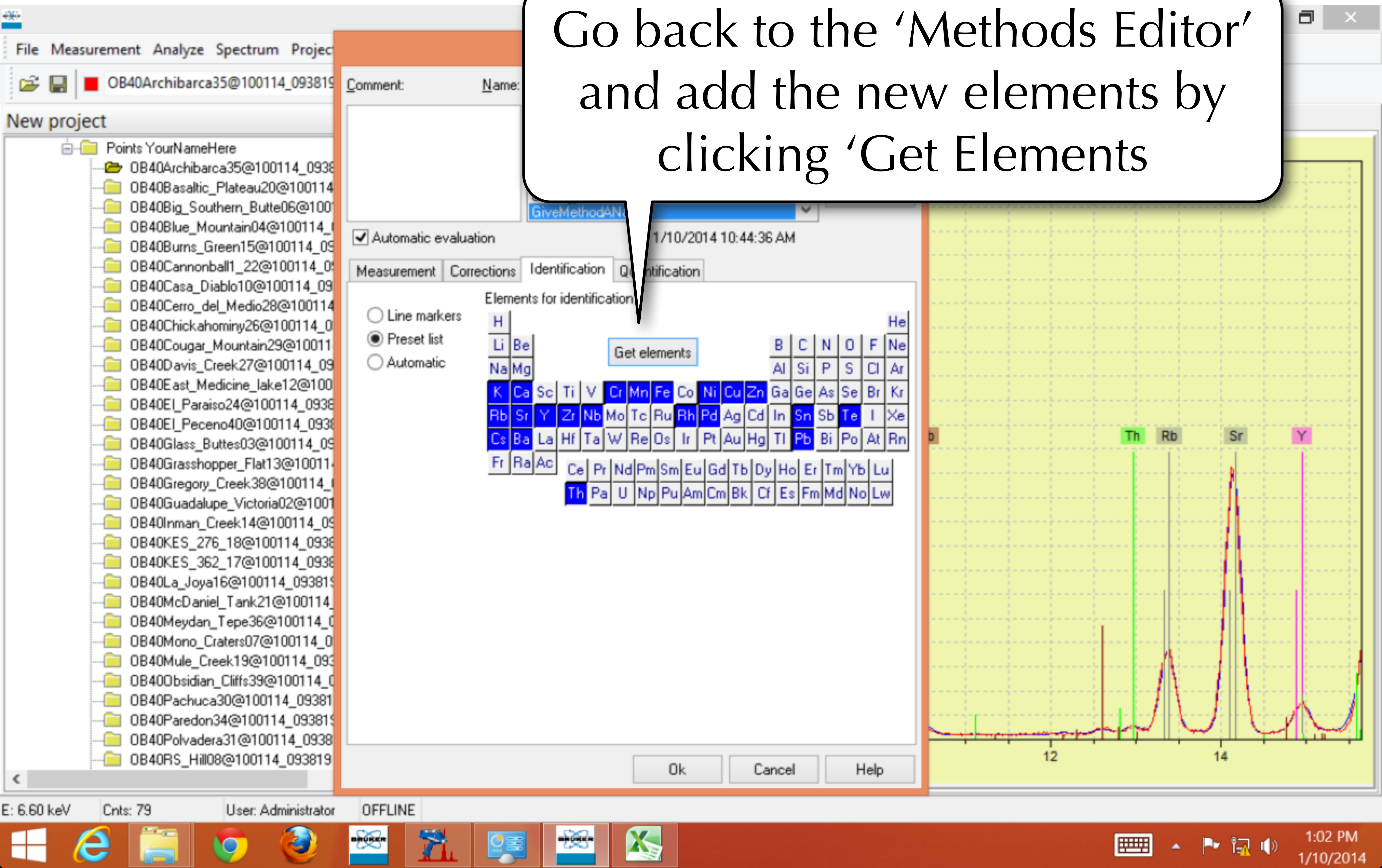
This is not a fluorescence peak, it will not match the Bayesian deconvolution, that is ok

Bayesian Deconvolution

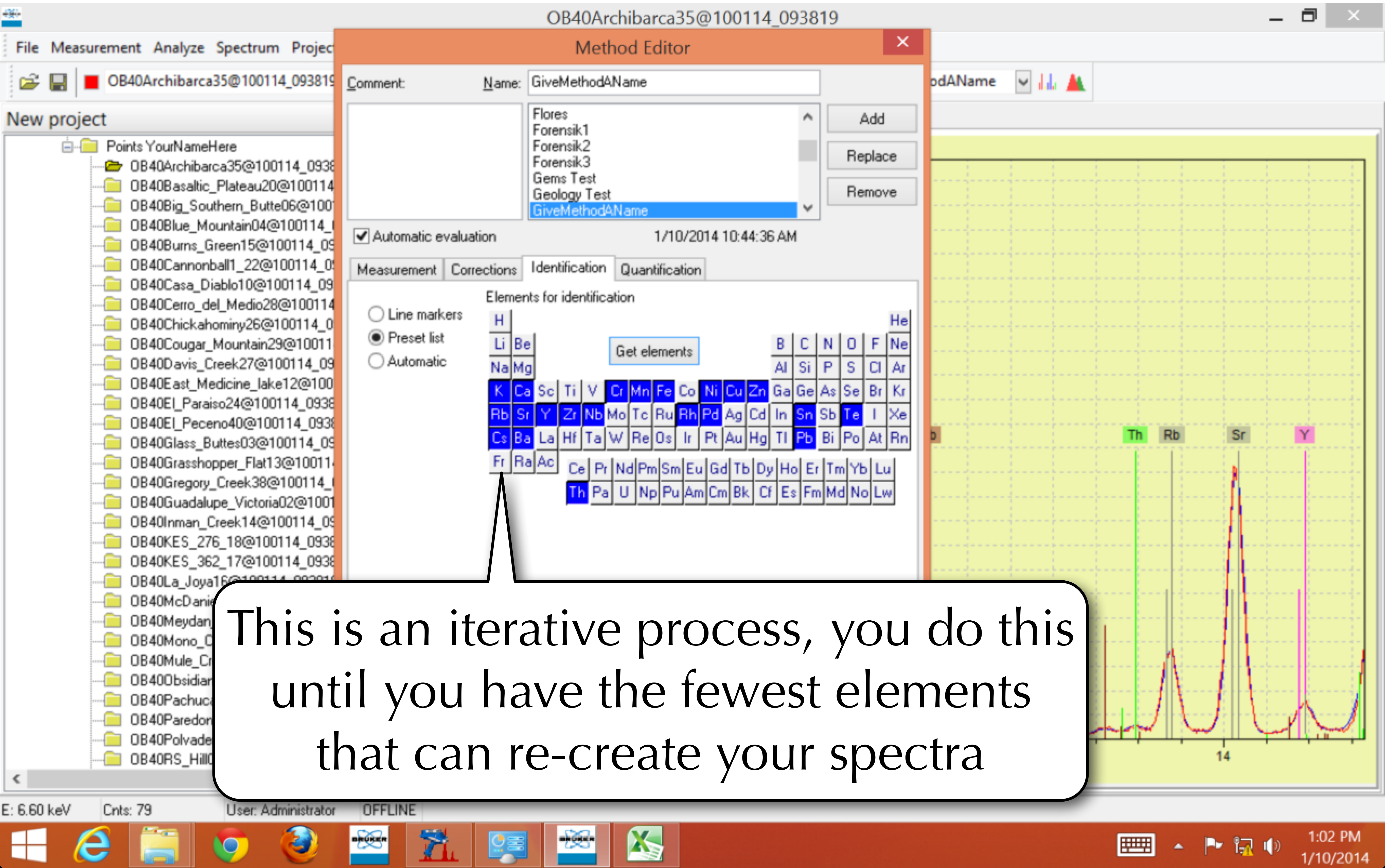


Bayesian Deconvolution

Go back to the ‘Methods Editor’ and add the new elements by clicking ‘Get Elements

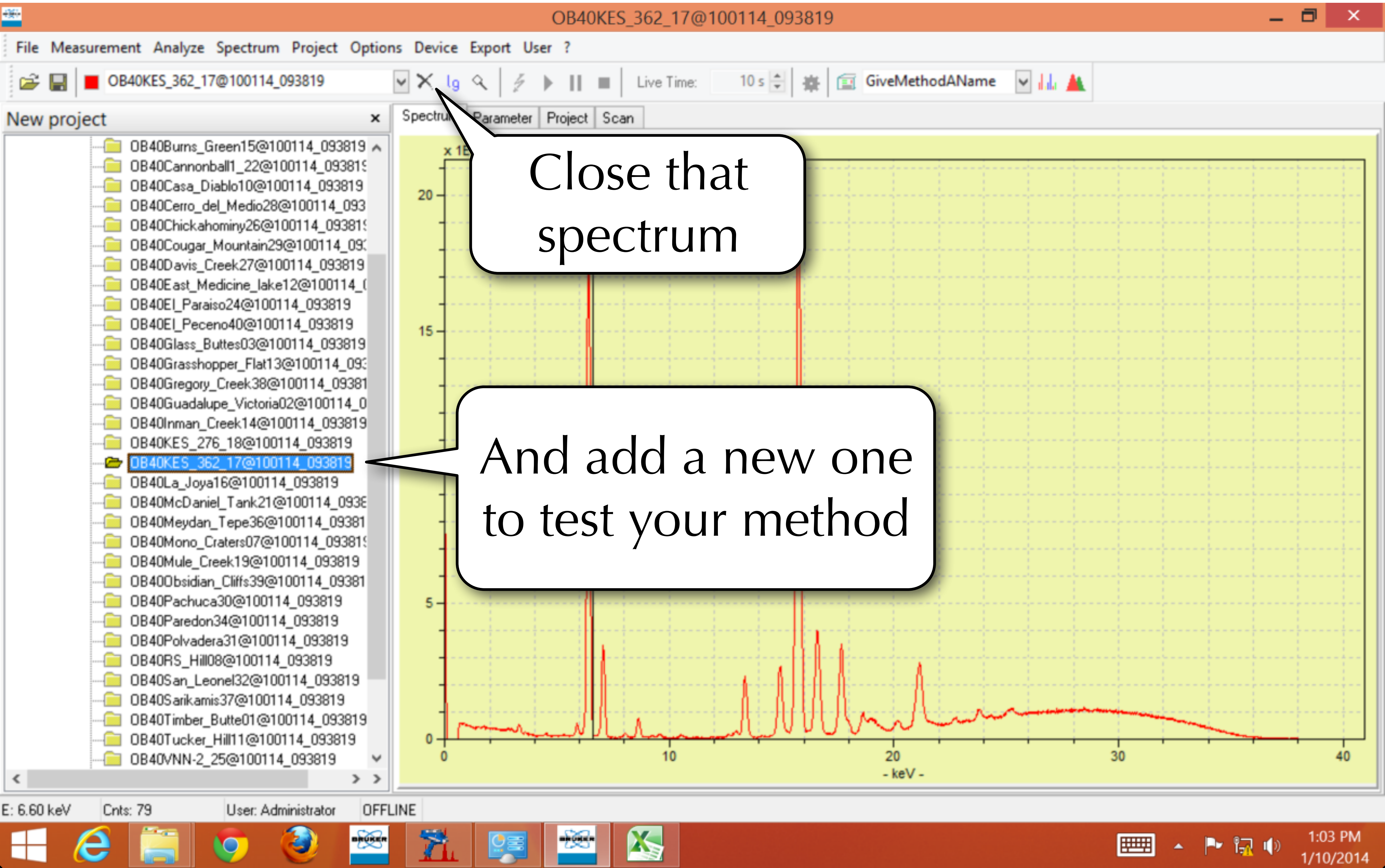


Bayesian Deconvolution

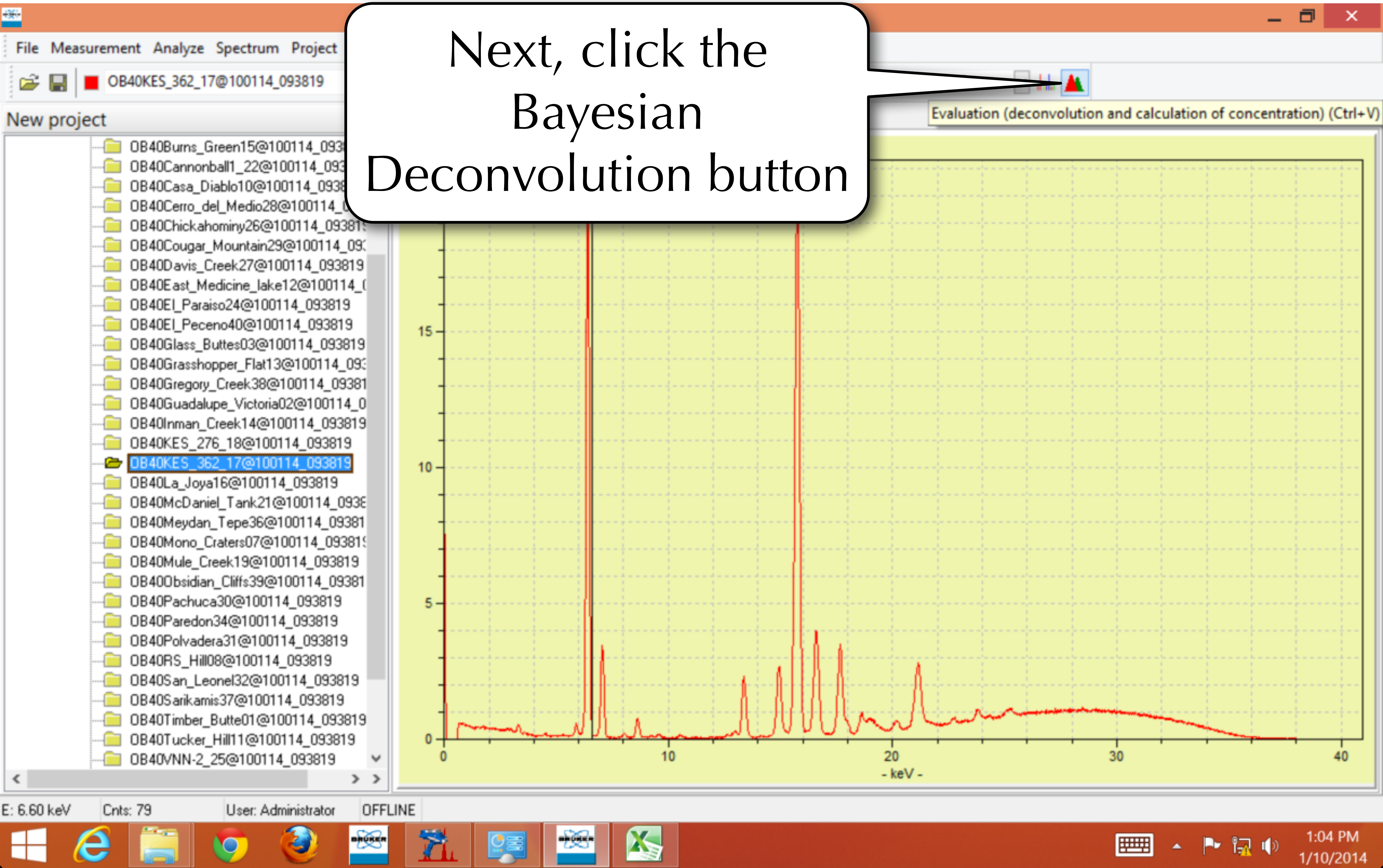


This is an iterative process, you do this until you have the fewest elements that can re-create your spectra

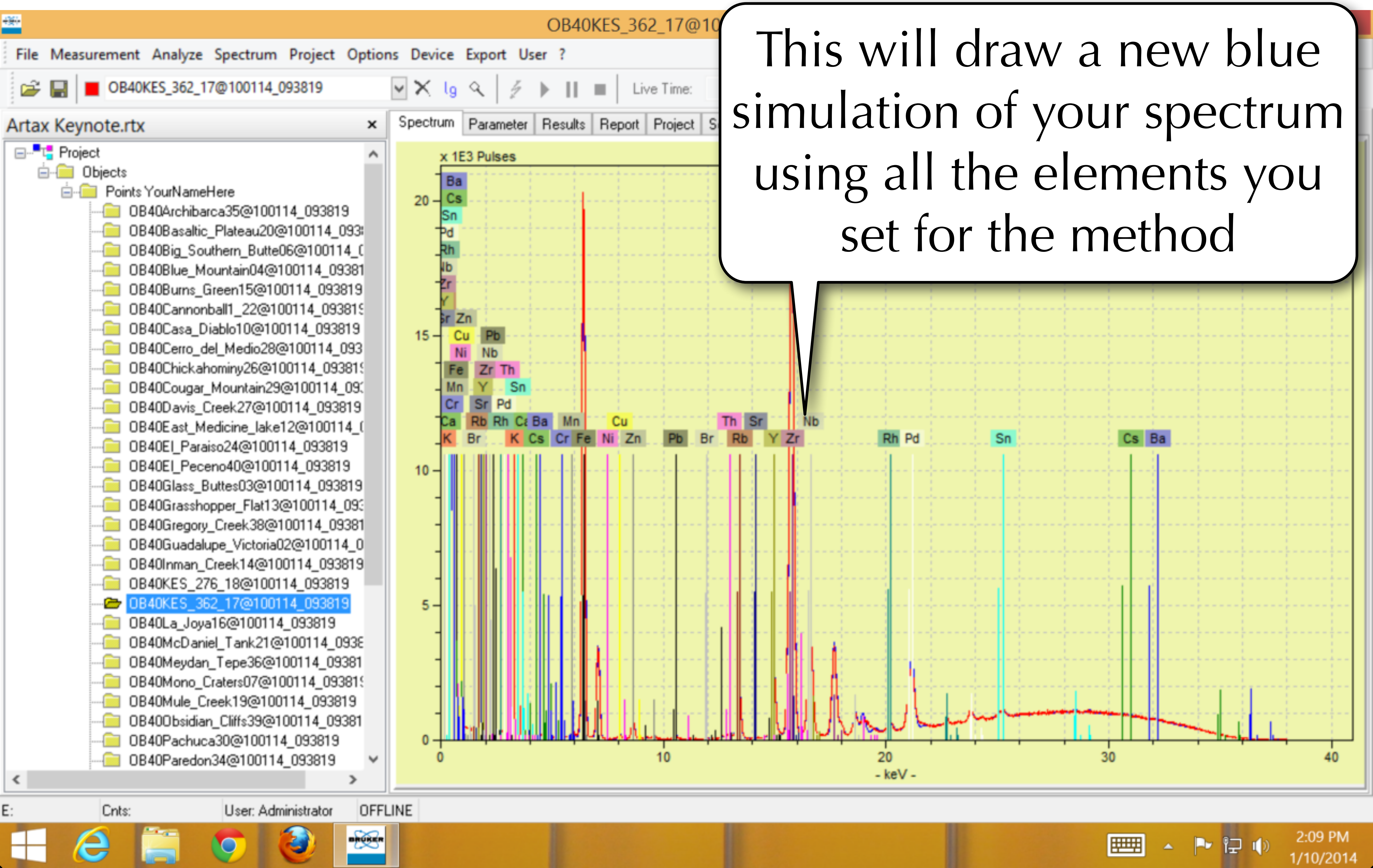
Bayesian Deconvolution



Bayesian Deconvolution

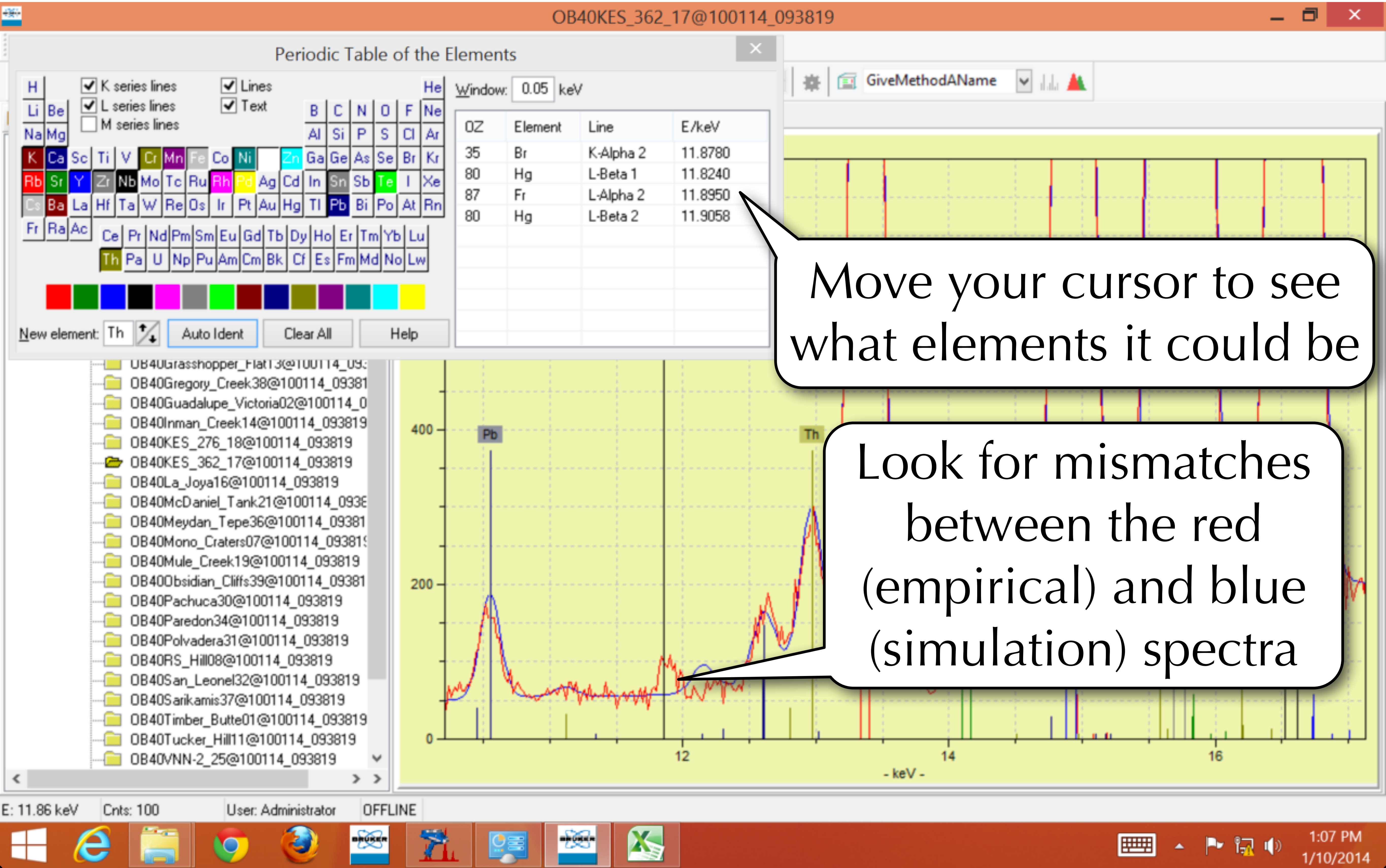


Bayesian Deconvolution



This will draw a new blue simulation of your spectrum using all the elements you set for the method

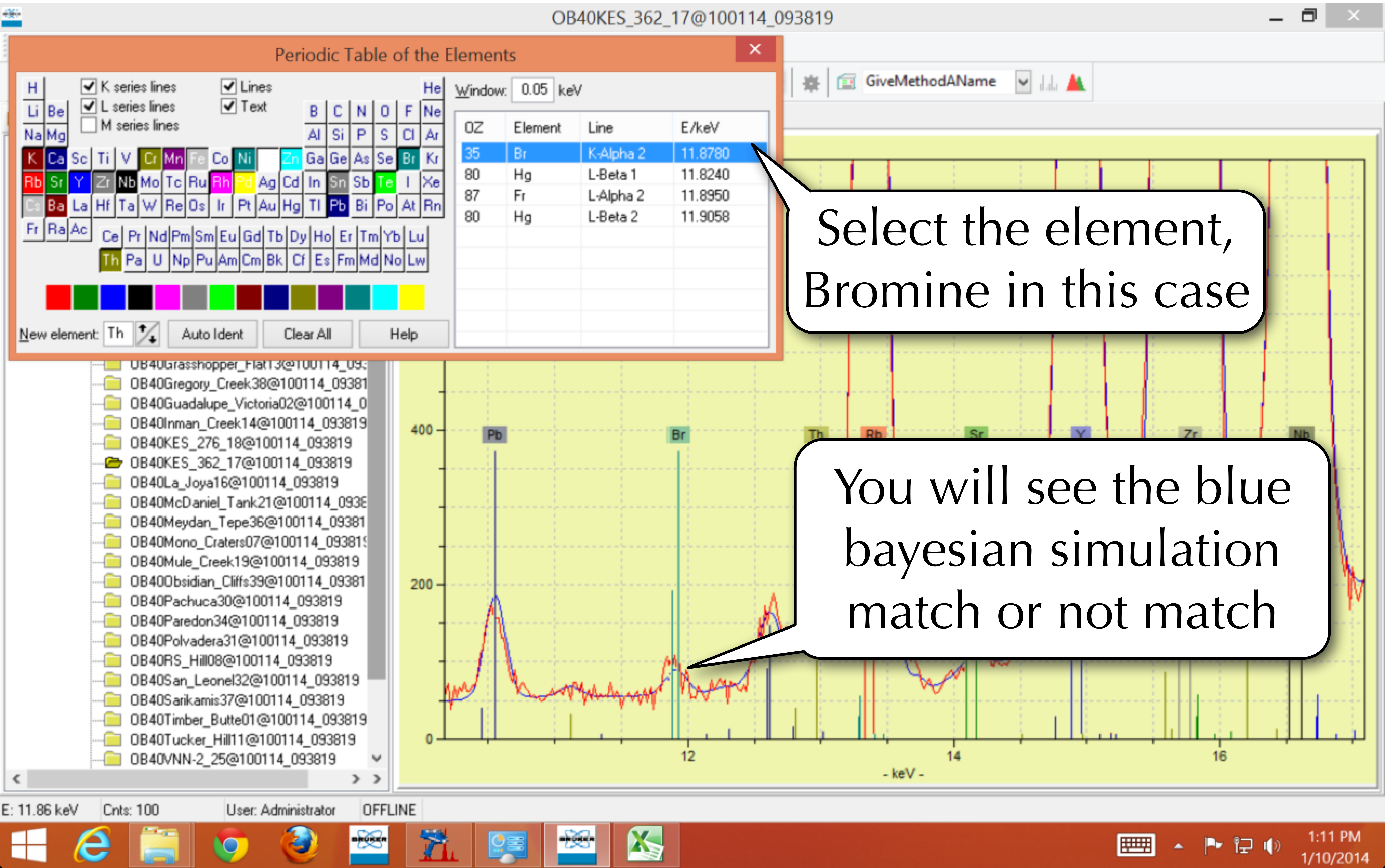
Bayesian Deconvolution



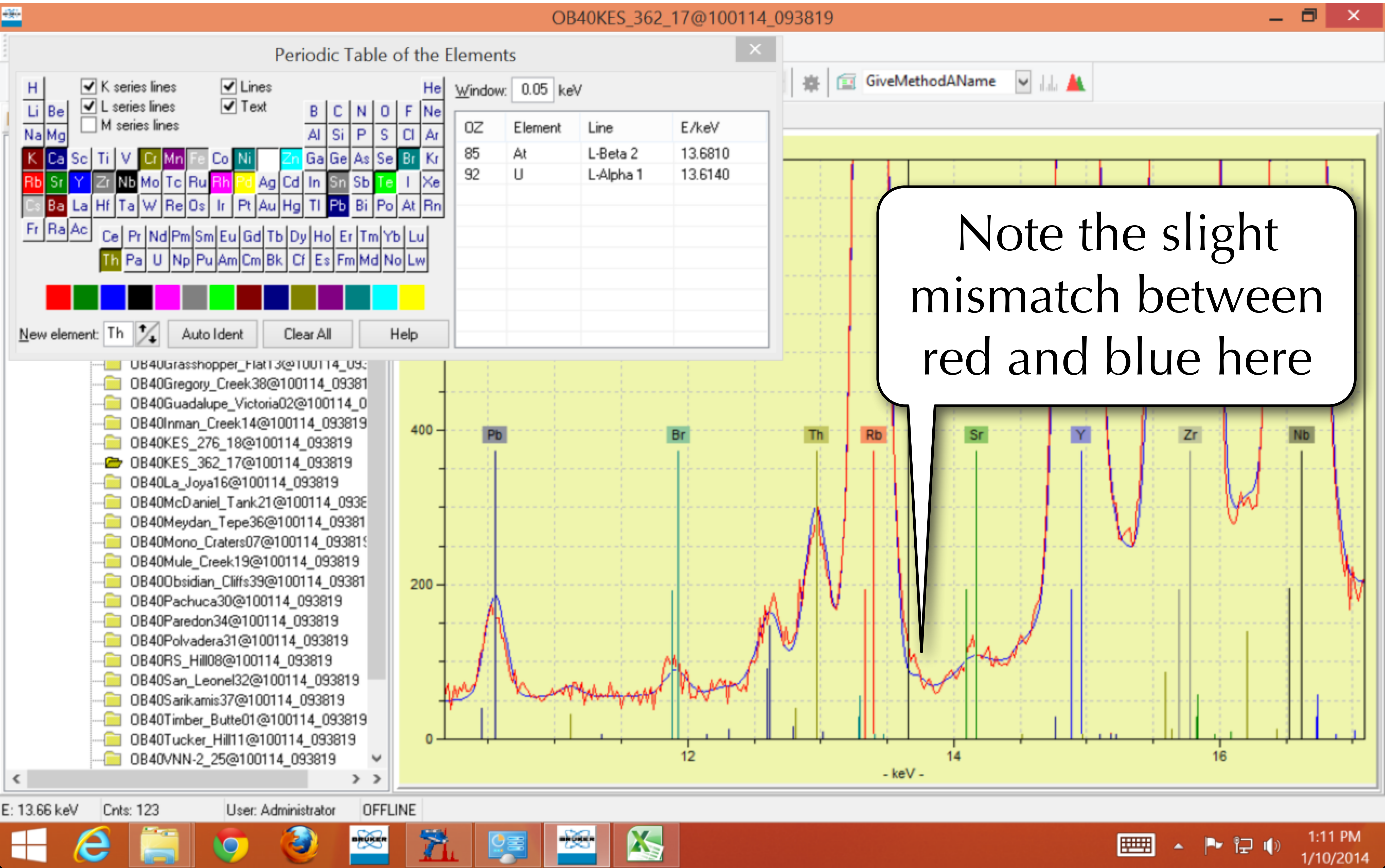
Move your cursor to see what elements it could be

Look for mismatches between the red (empirical) and blue (simulation) spectra

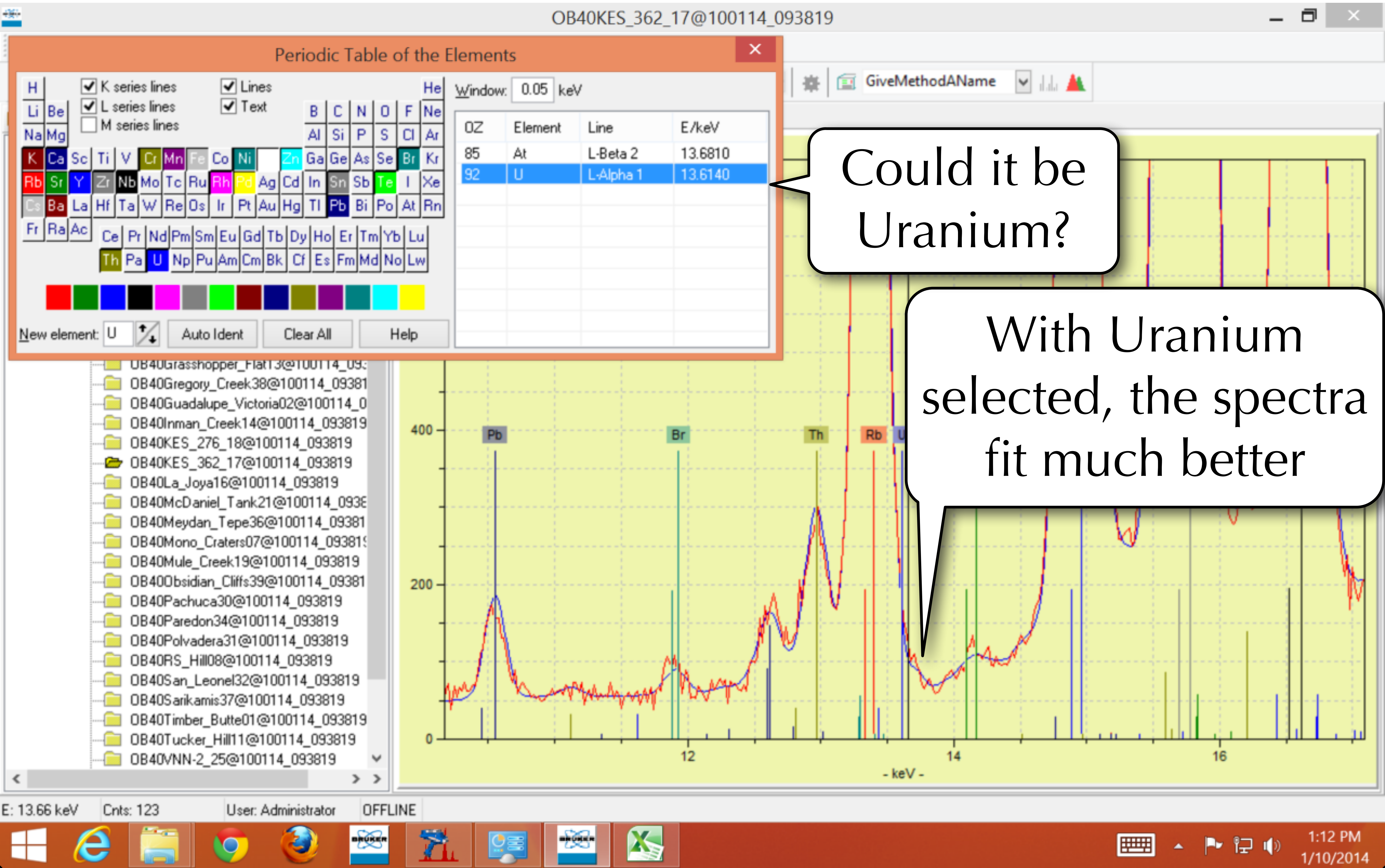
Bayesian Deconvolution



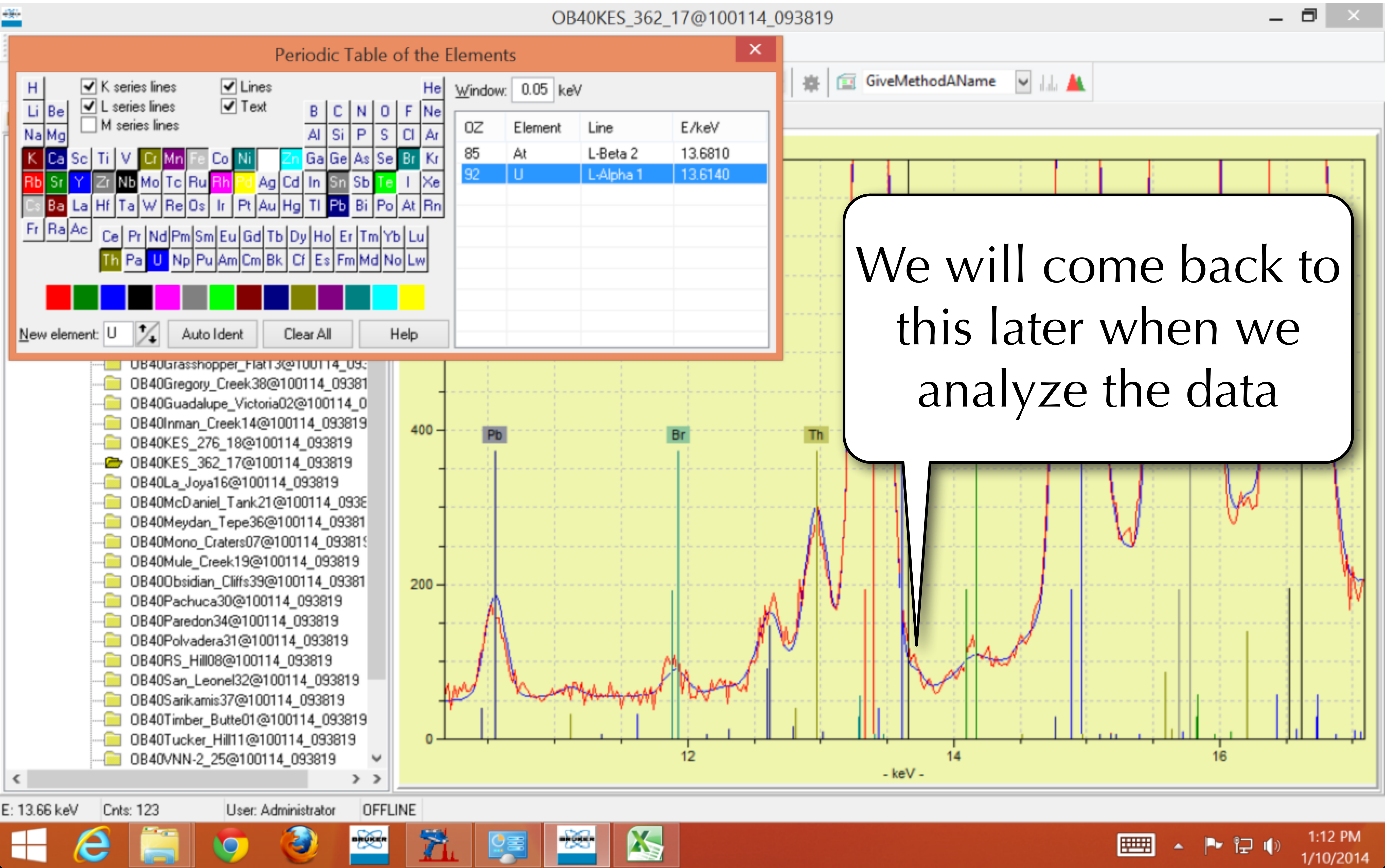
Bayesian Deconvolution



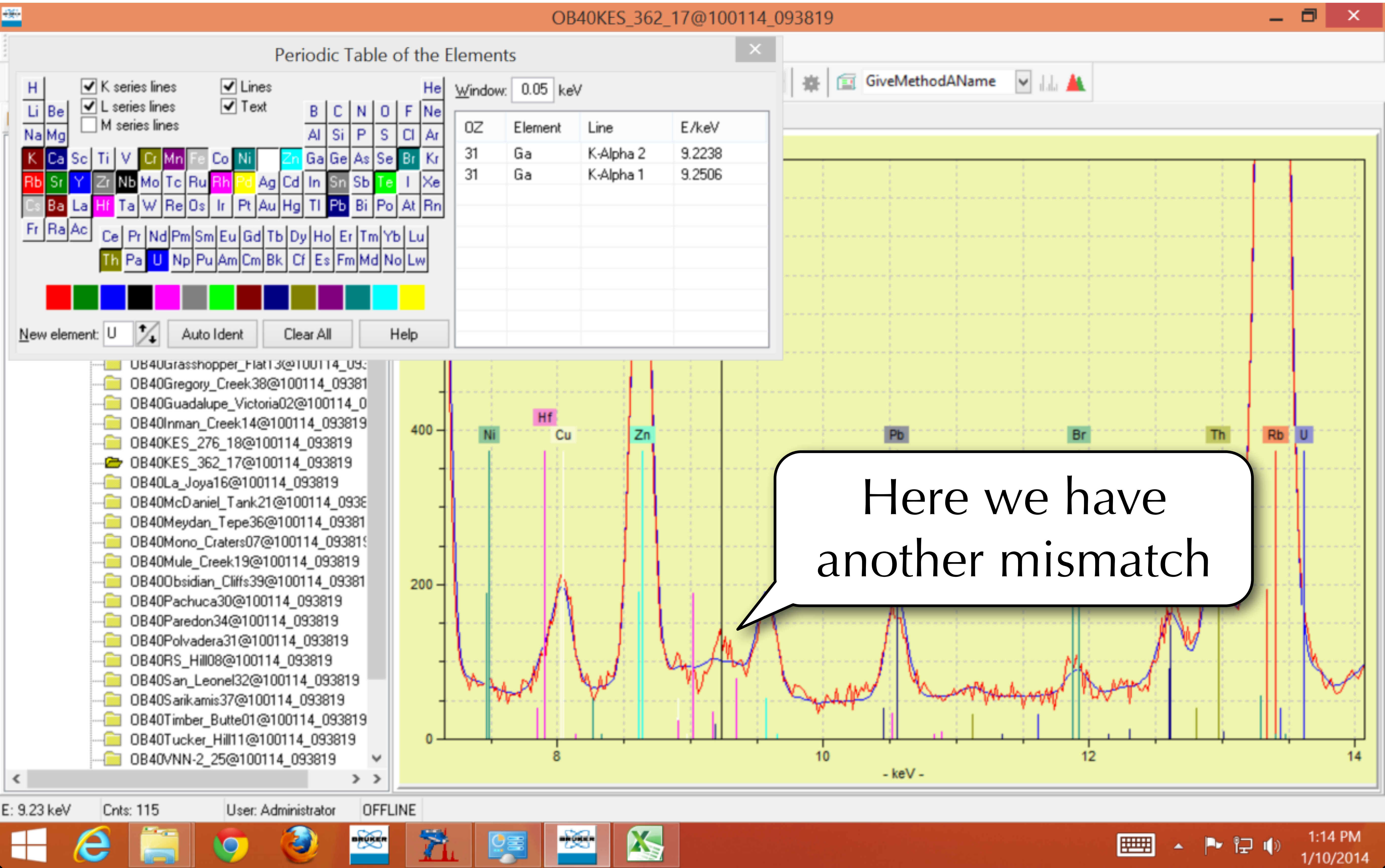
Bayesian Deconvolution



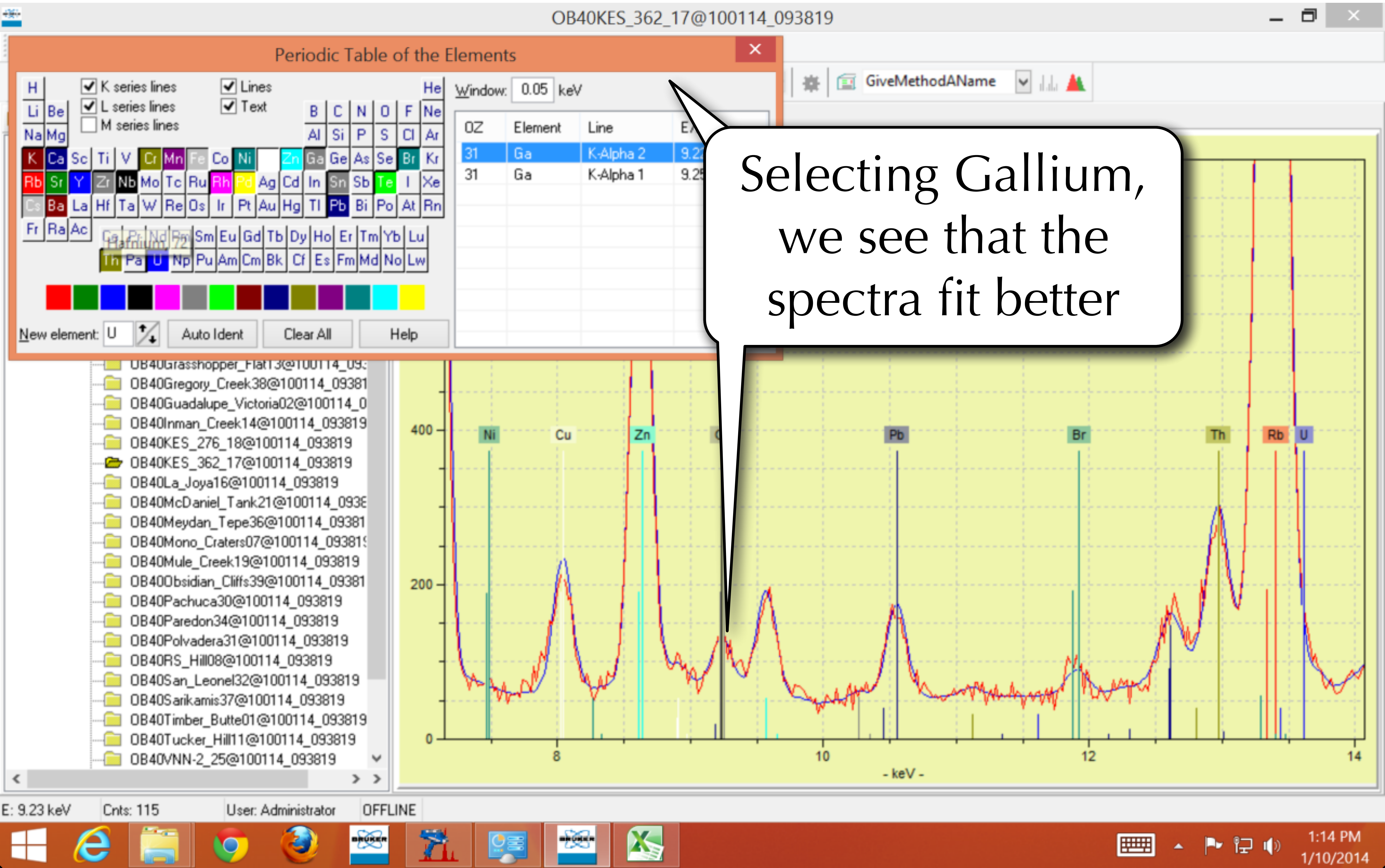
Bayesian Deconvolution



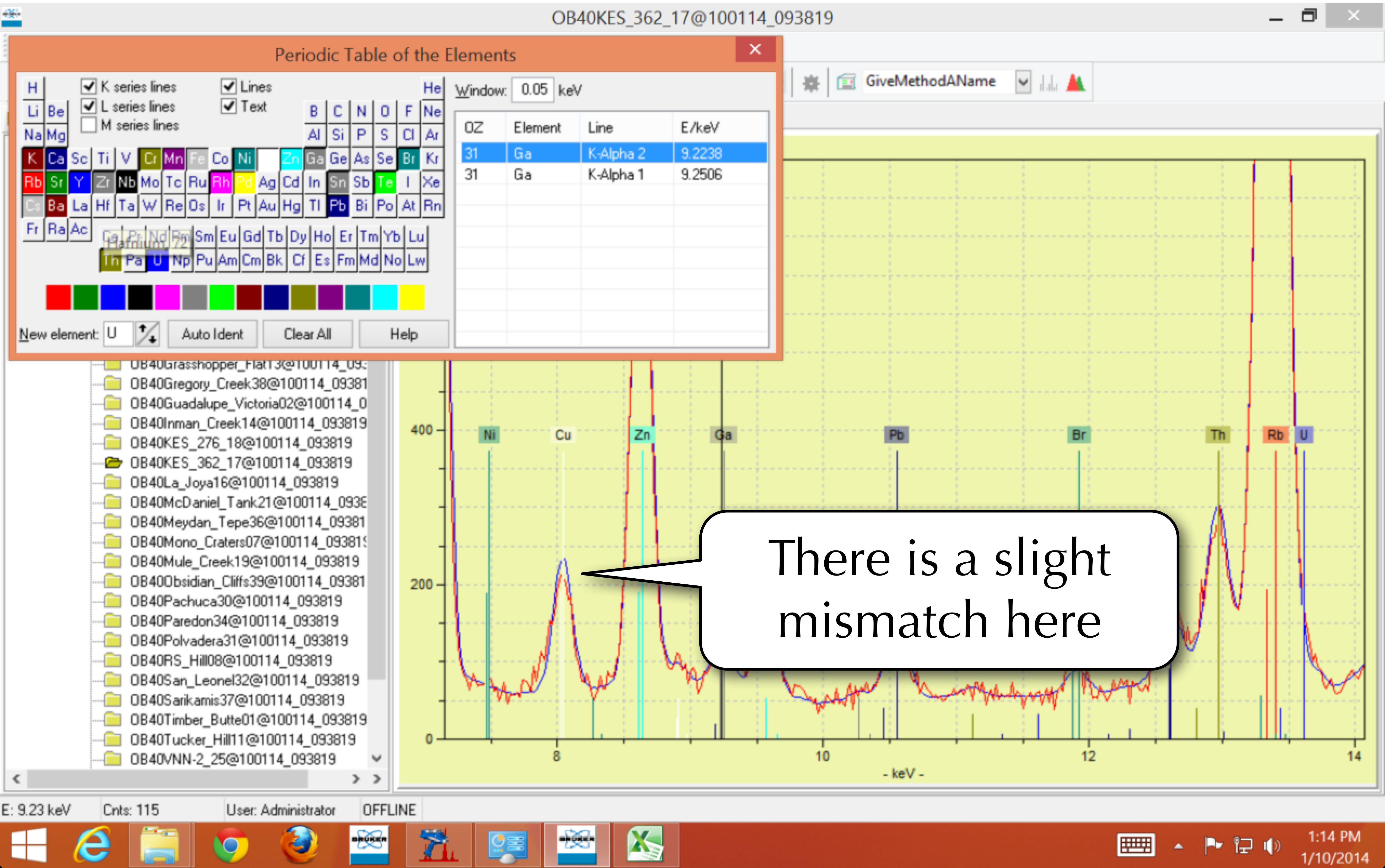
Bayesian Deconvolution



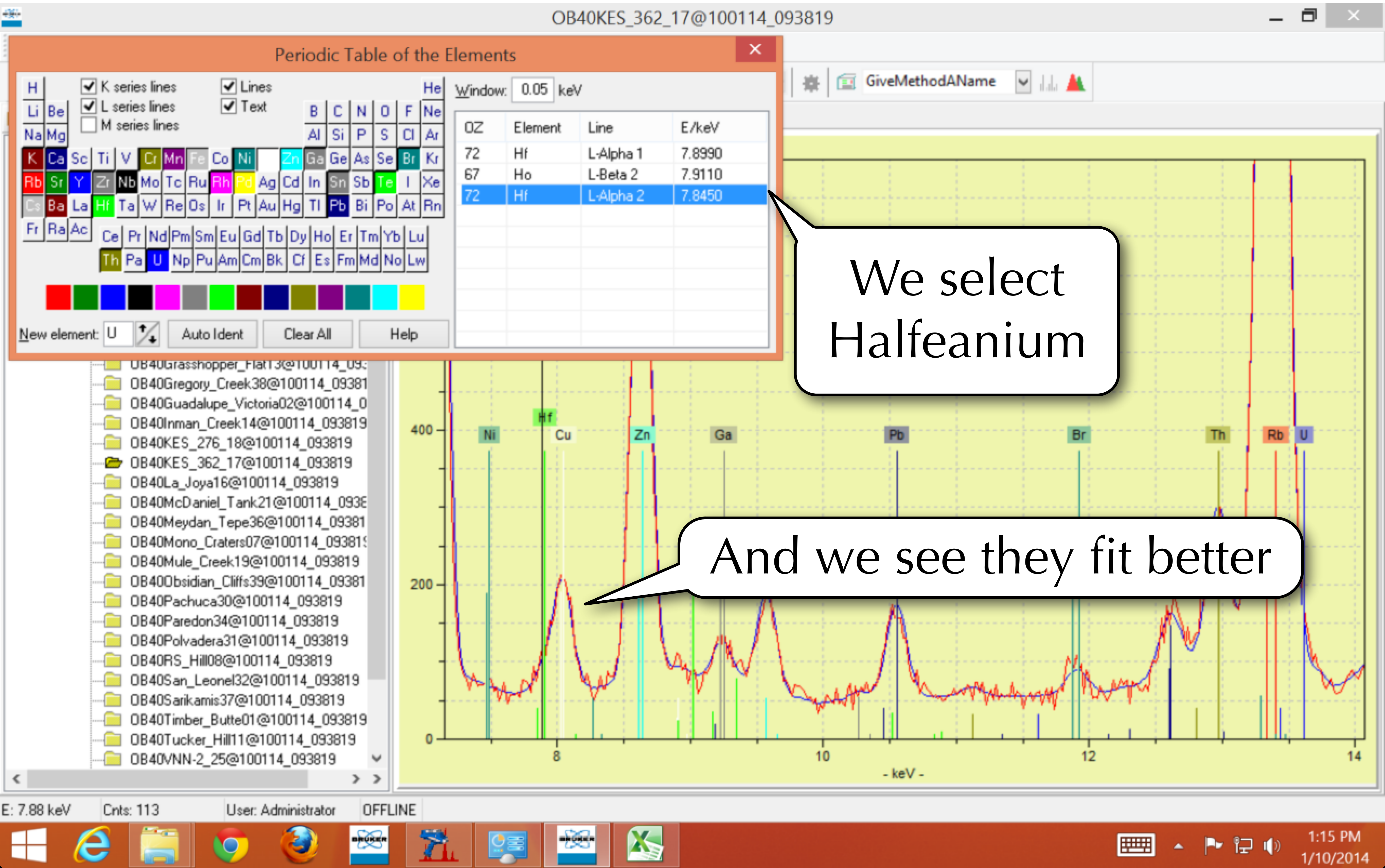
Bayesian Deconvolution



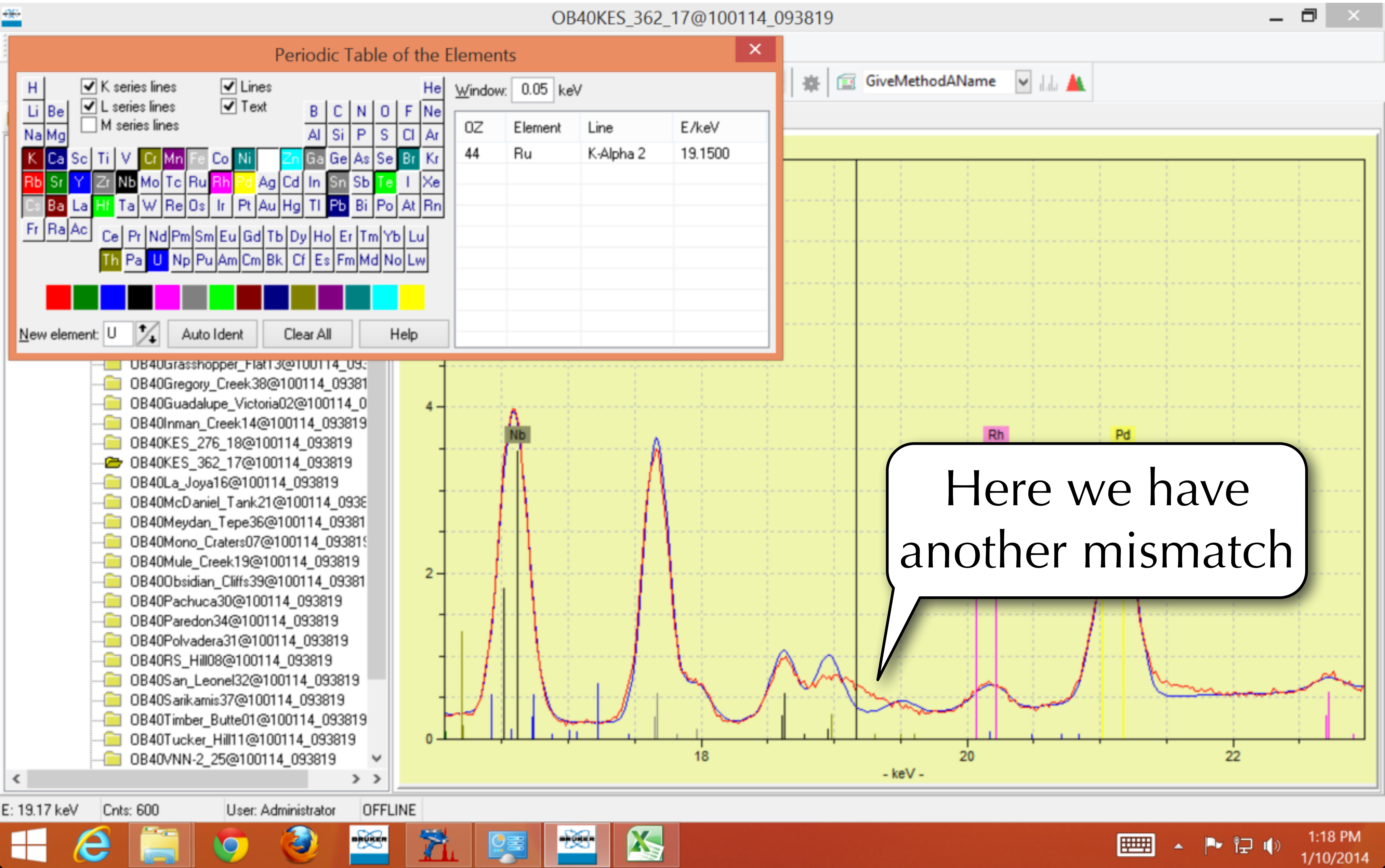
Bayesian Deconvolution



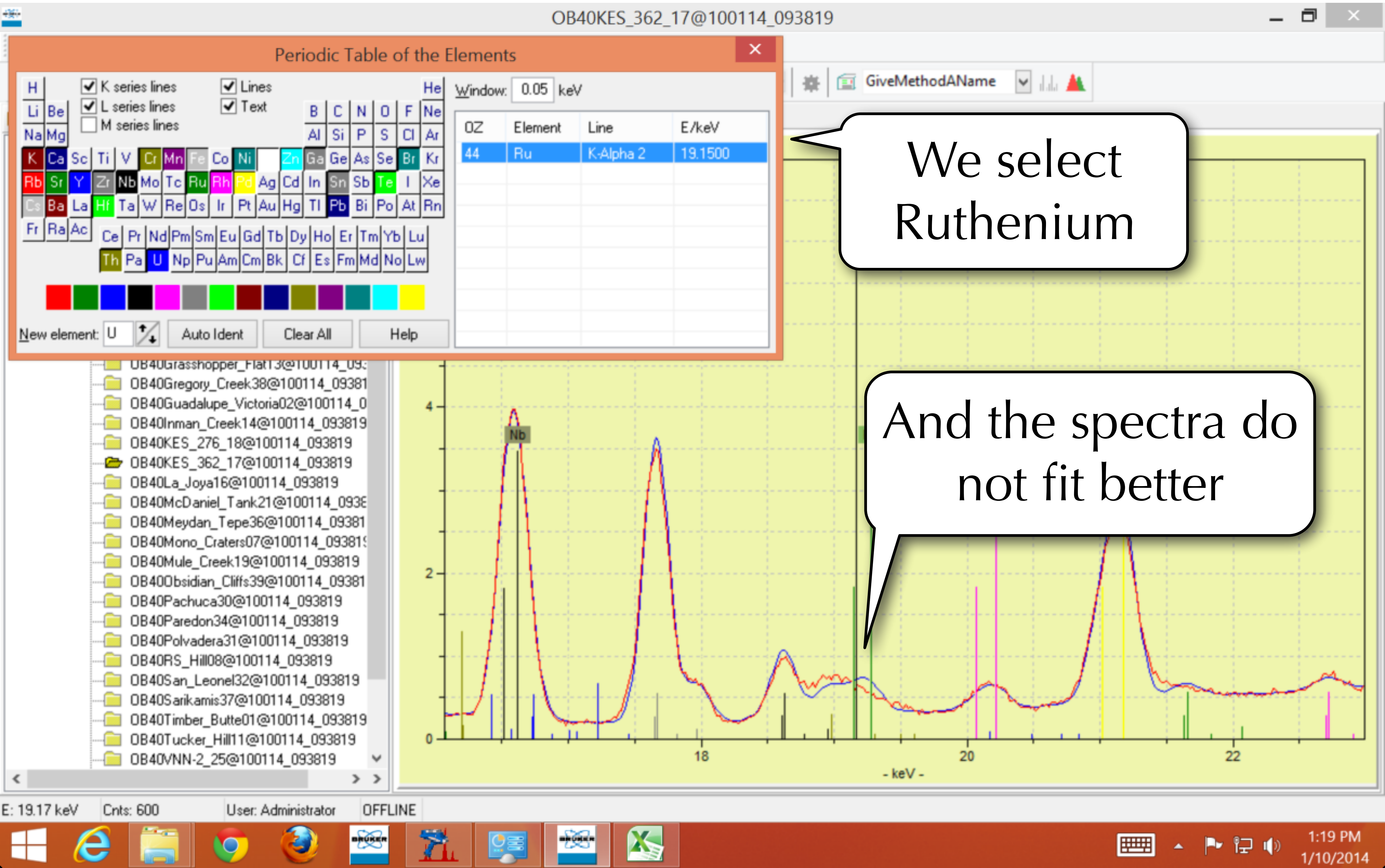
Bayesian Deconvolution



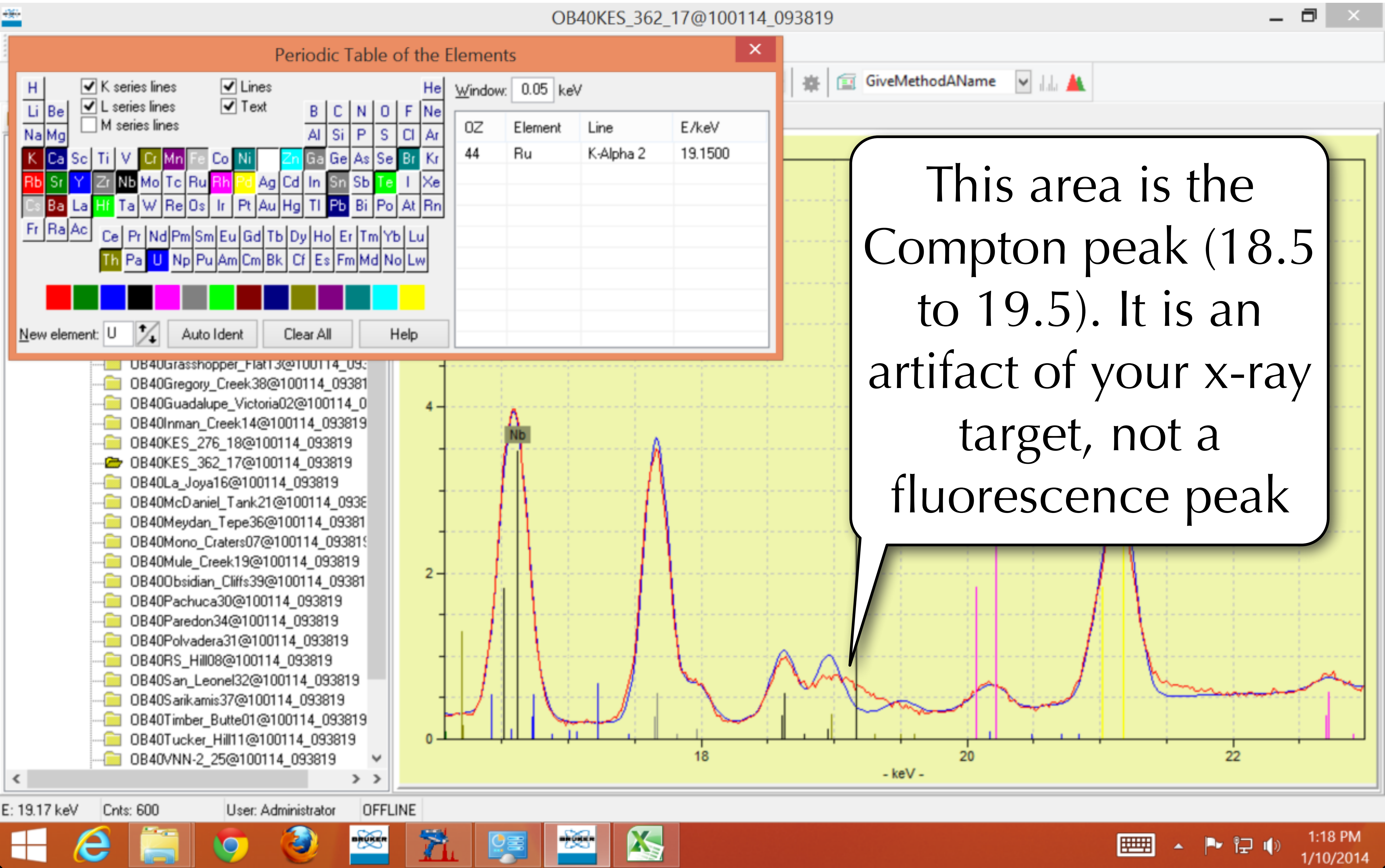
Bayesian Deconvolution



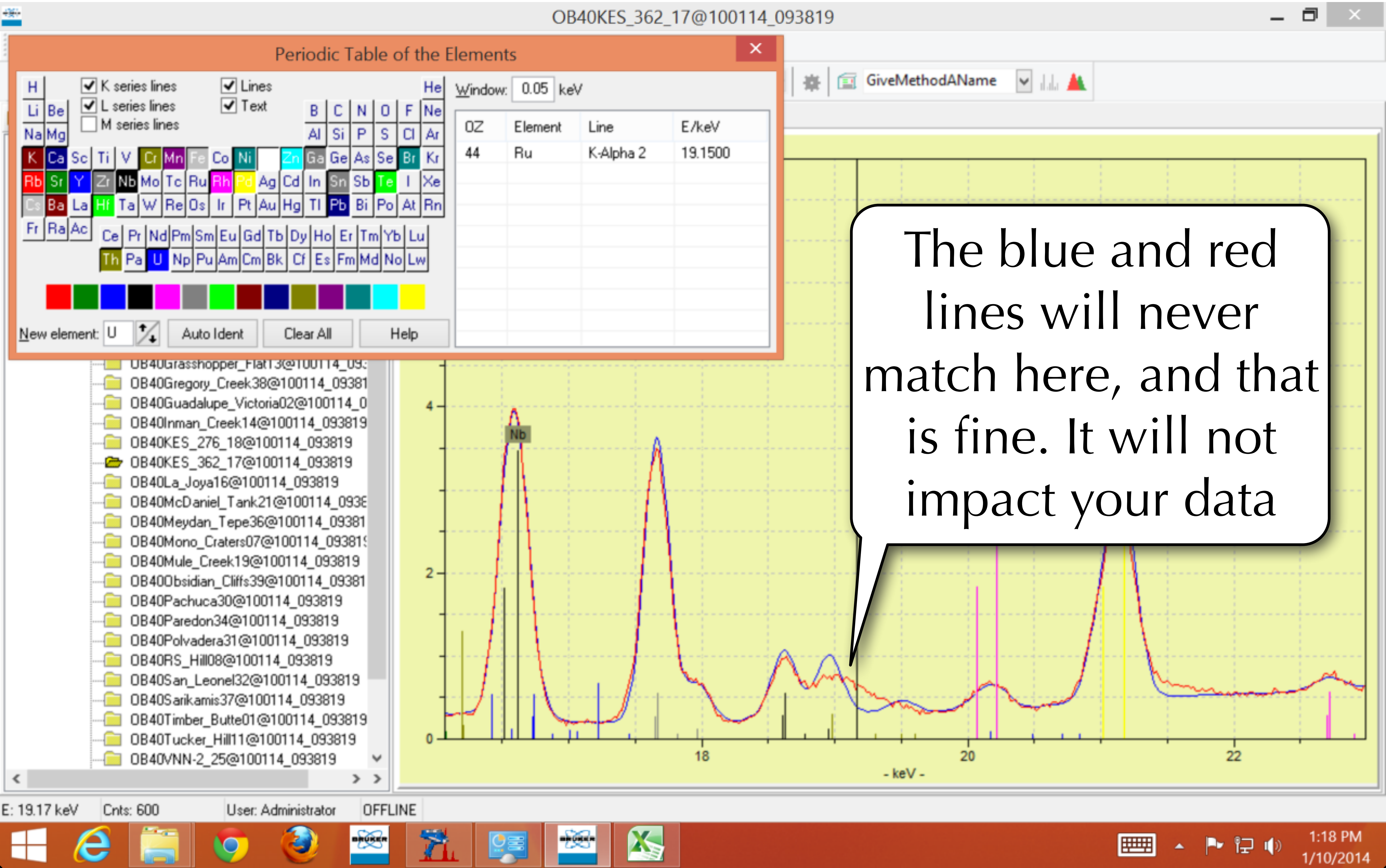
Bayesian Deconvolution



Bayesian Deconvolution

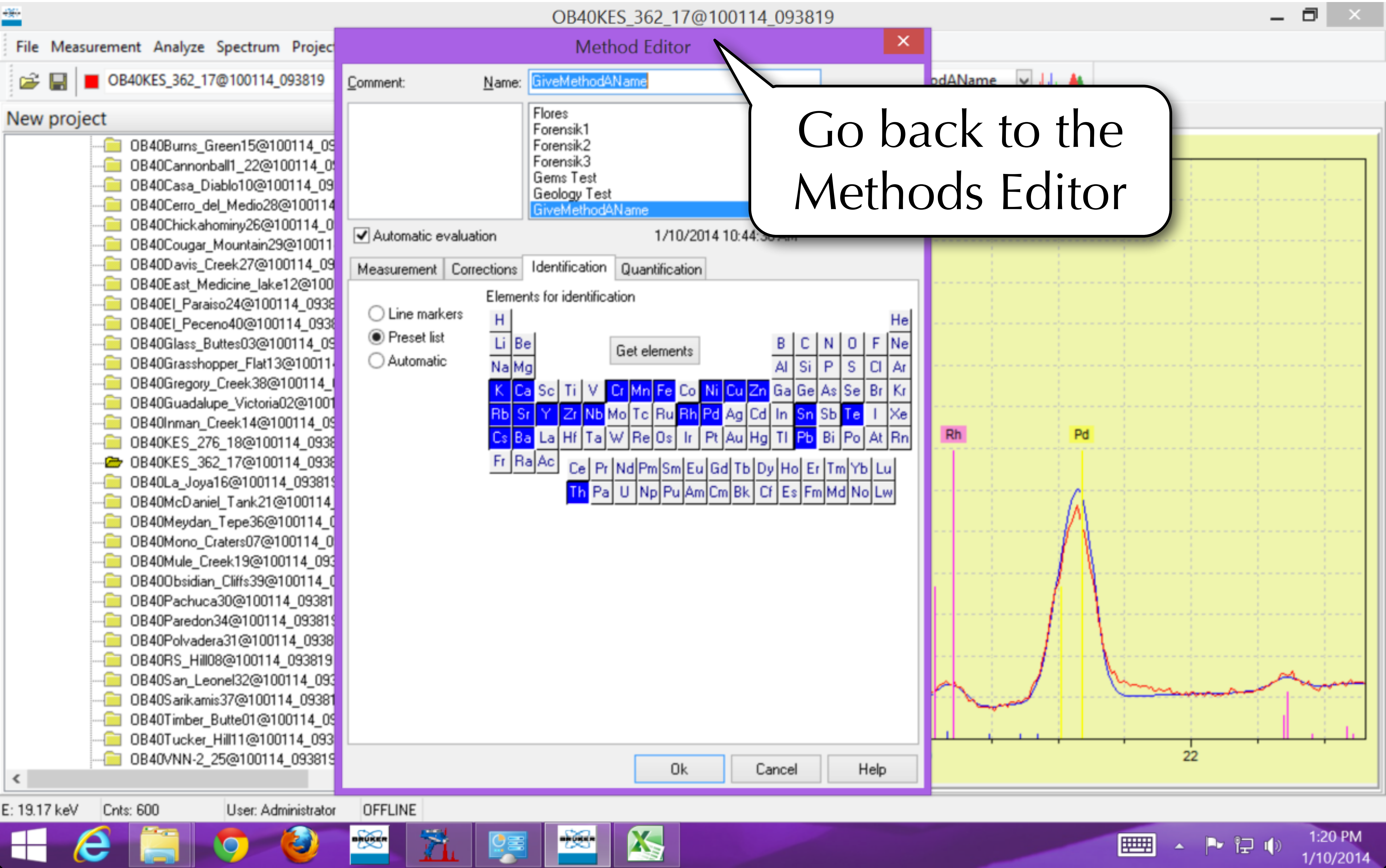


Bayesian Deconvolution



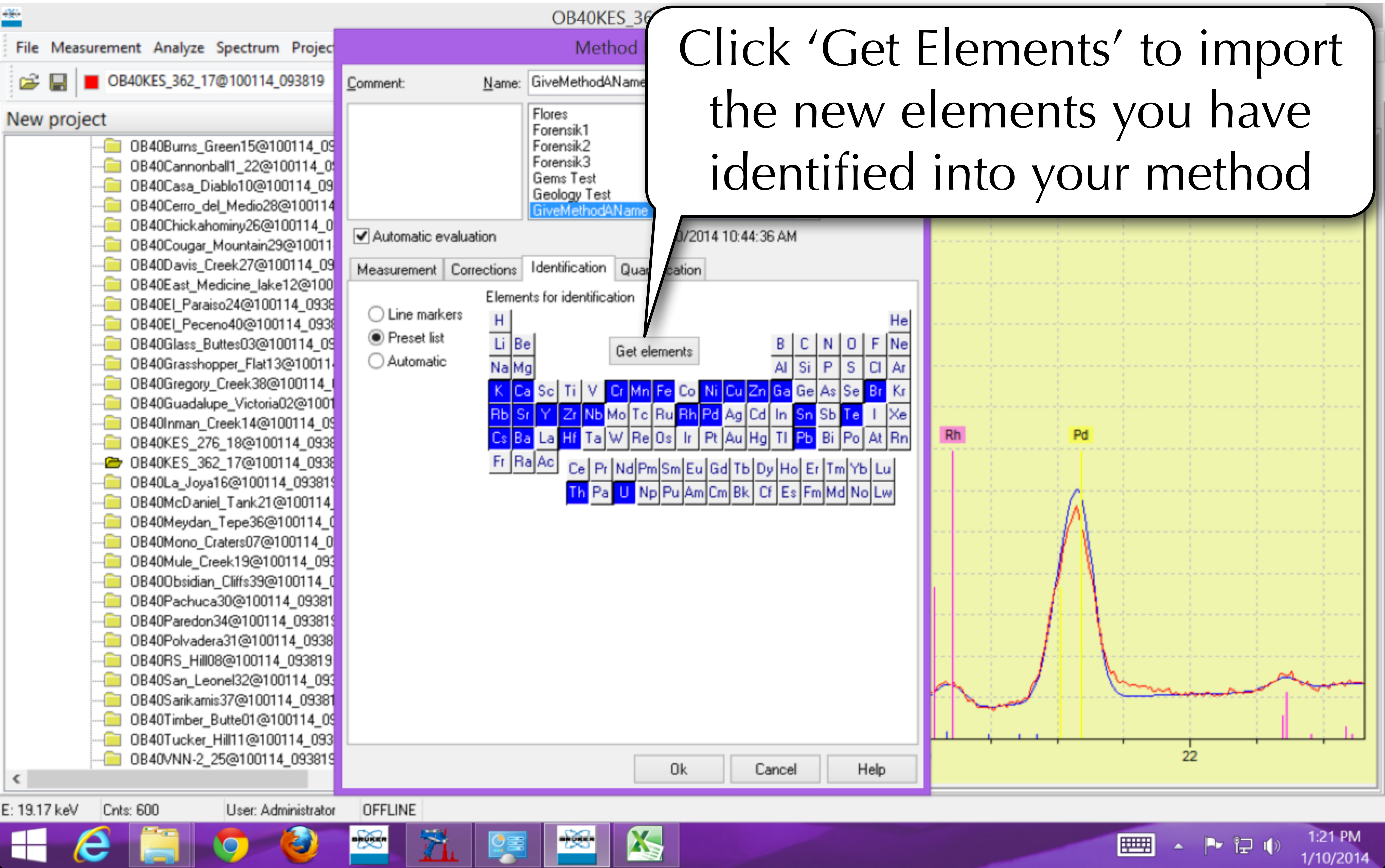
The blue and red lines will never match here, and that is fine. It will not impact your data

Bayesian Deconvolution

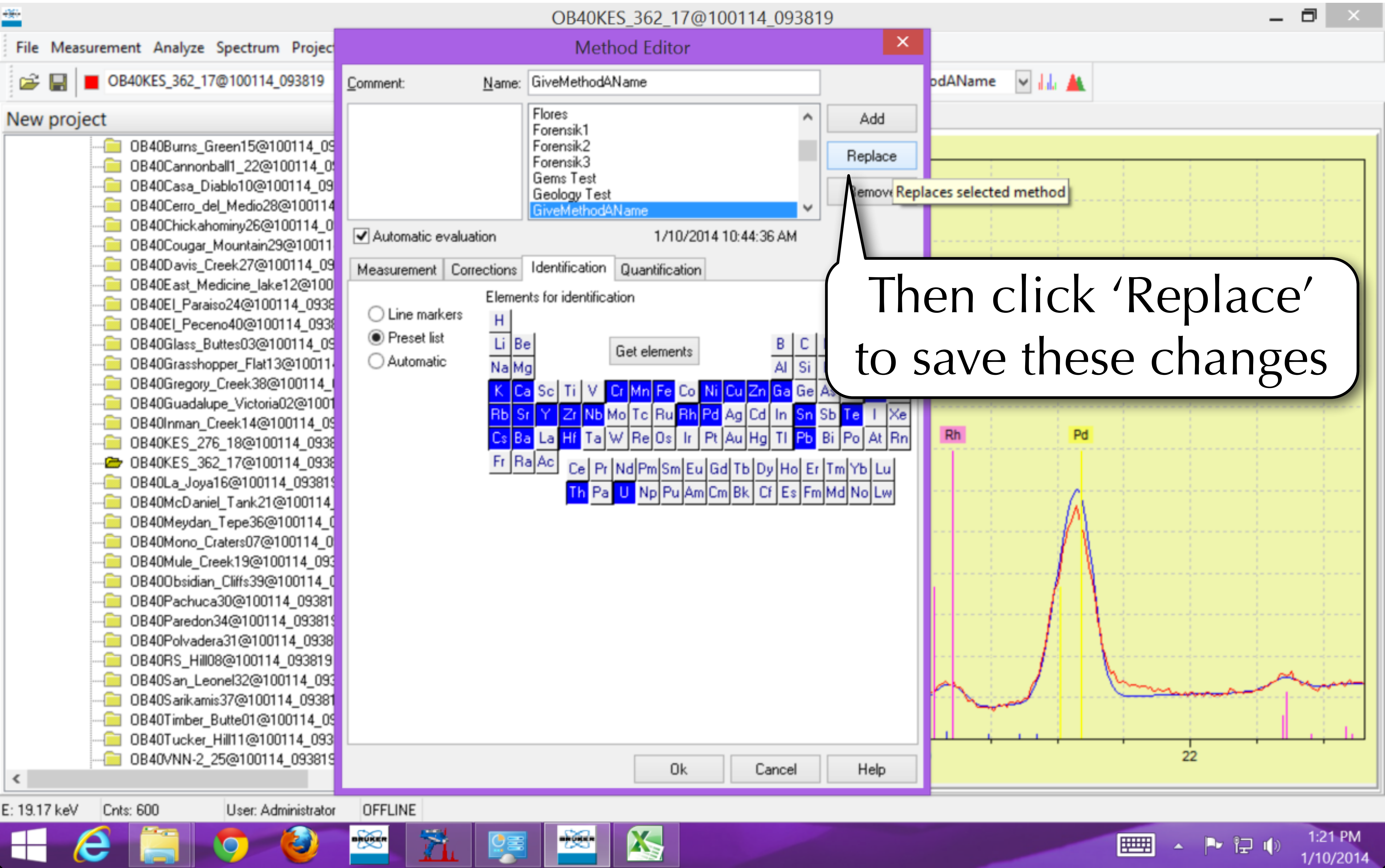


Bayesian Deconvolution

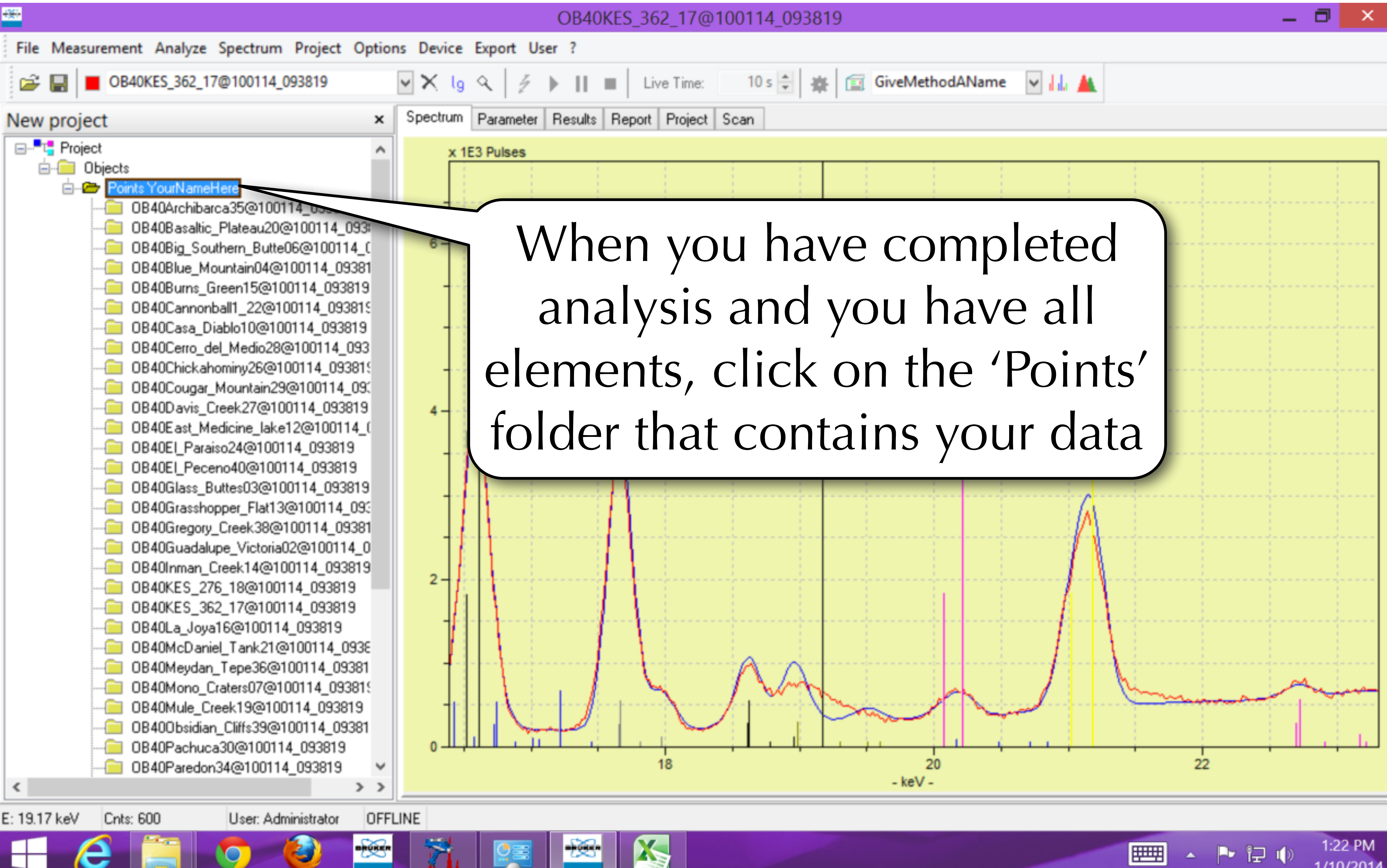
Click ‘Get Elements’ to import the new elements you have identified into your method



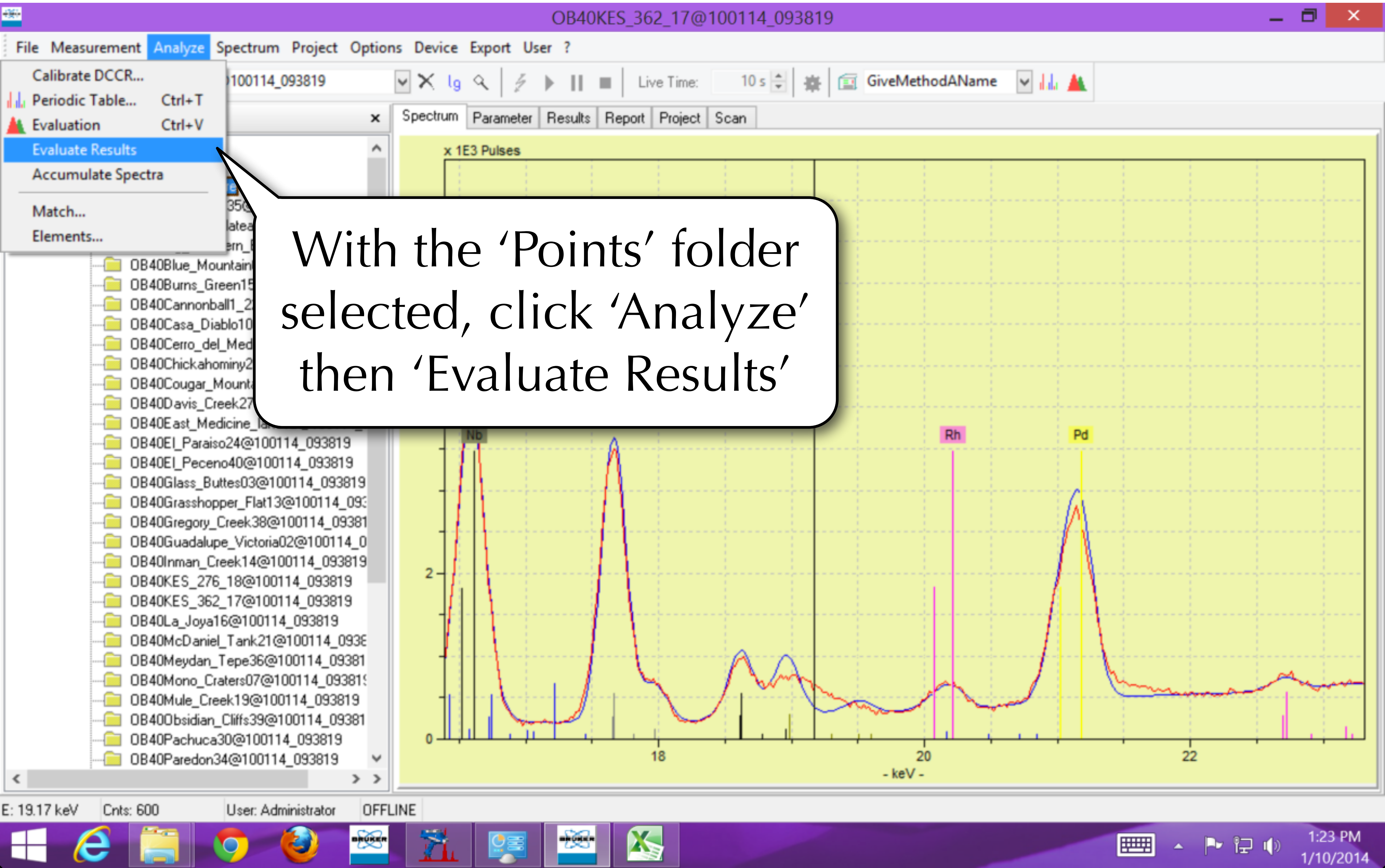
Bayesian Deconvolution



Bayesian Deconvolution



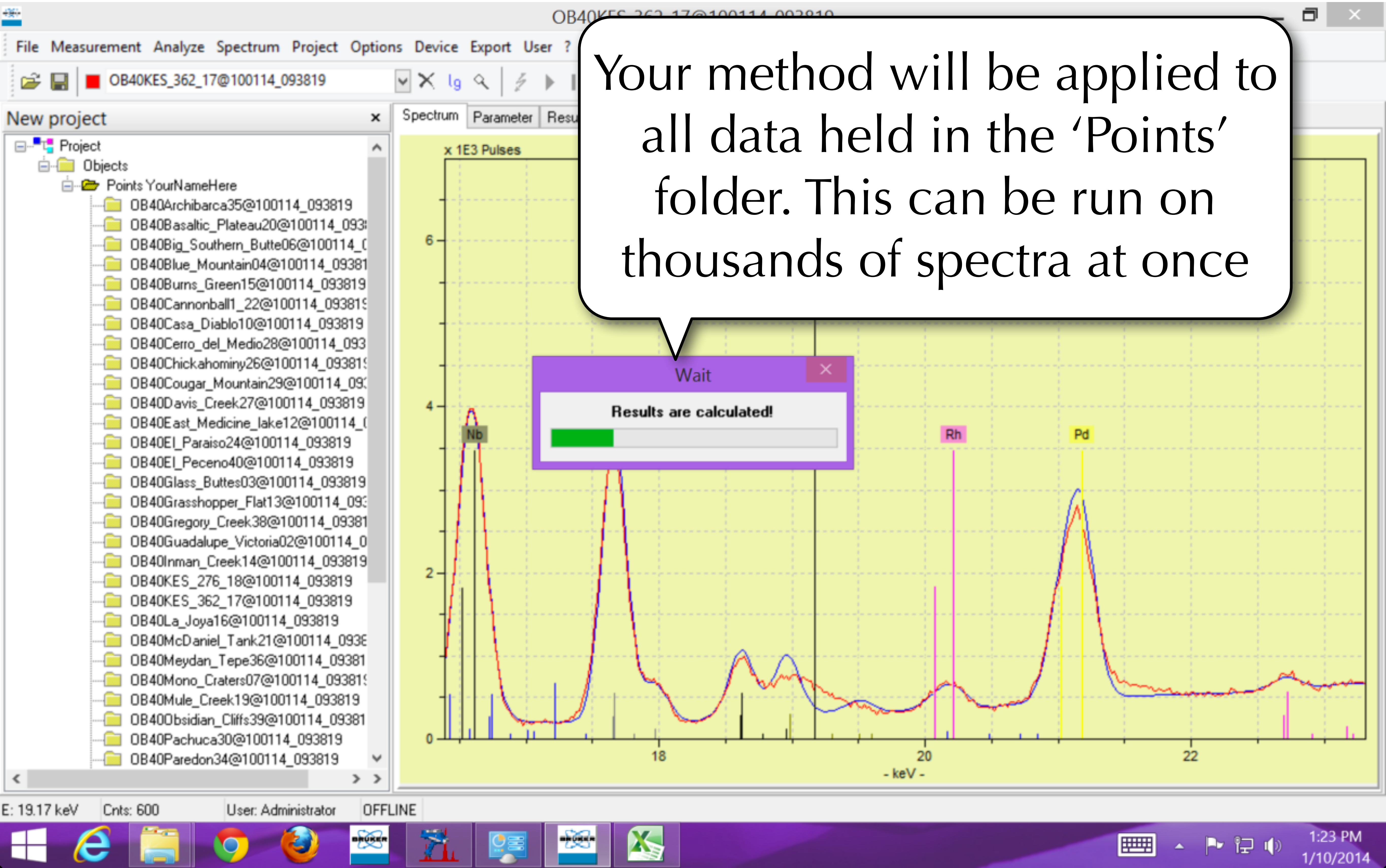
Bayesian Deconvolution



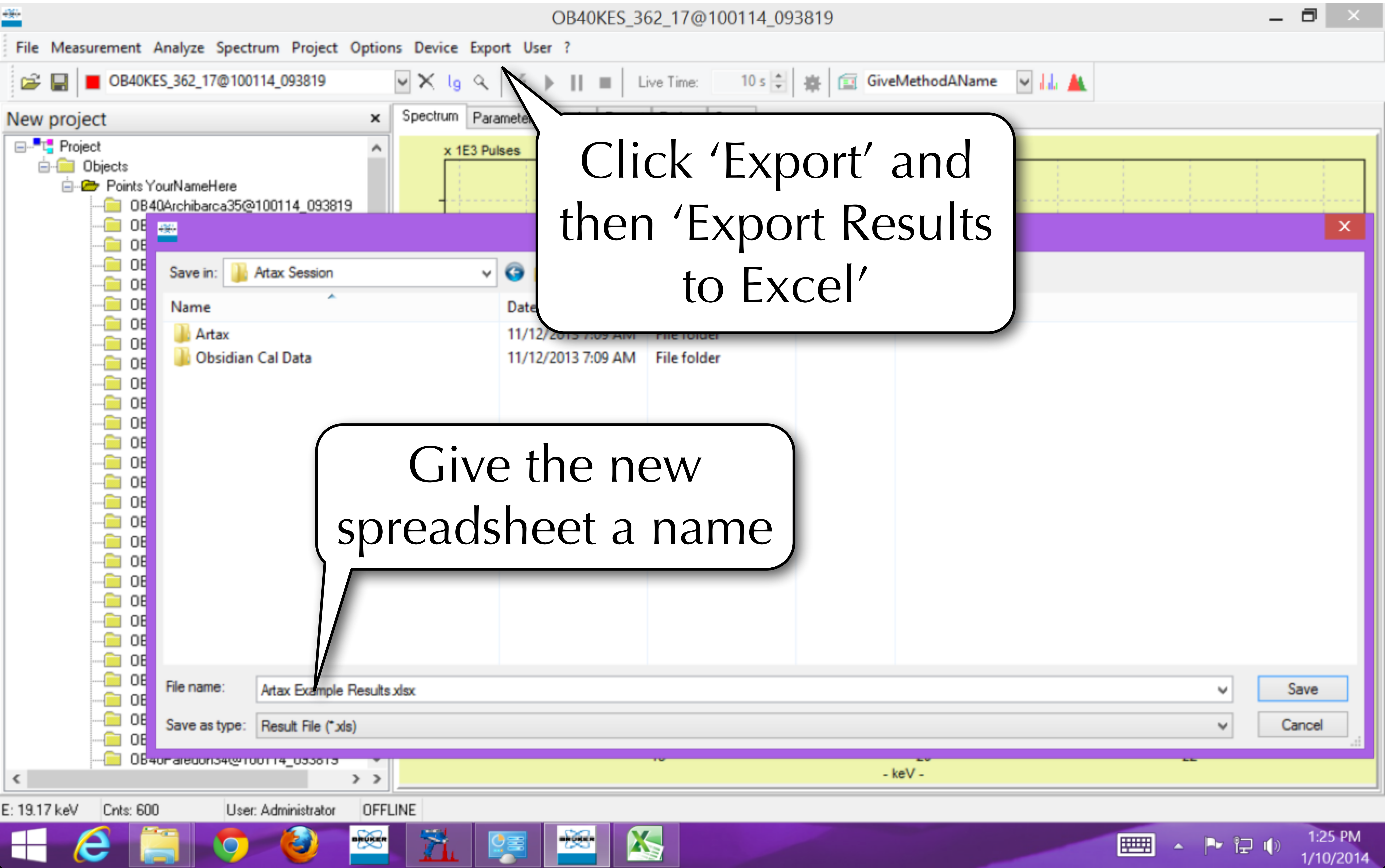
With the 'Points' folder selected, click 'Analyze' then 'Evaluate Results'

Bayesian Deconvolution

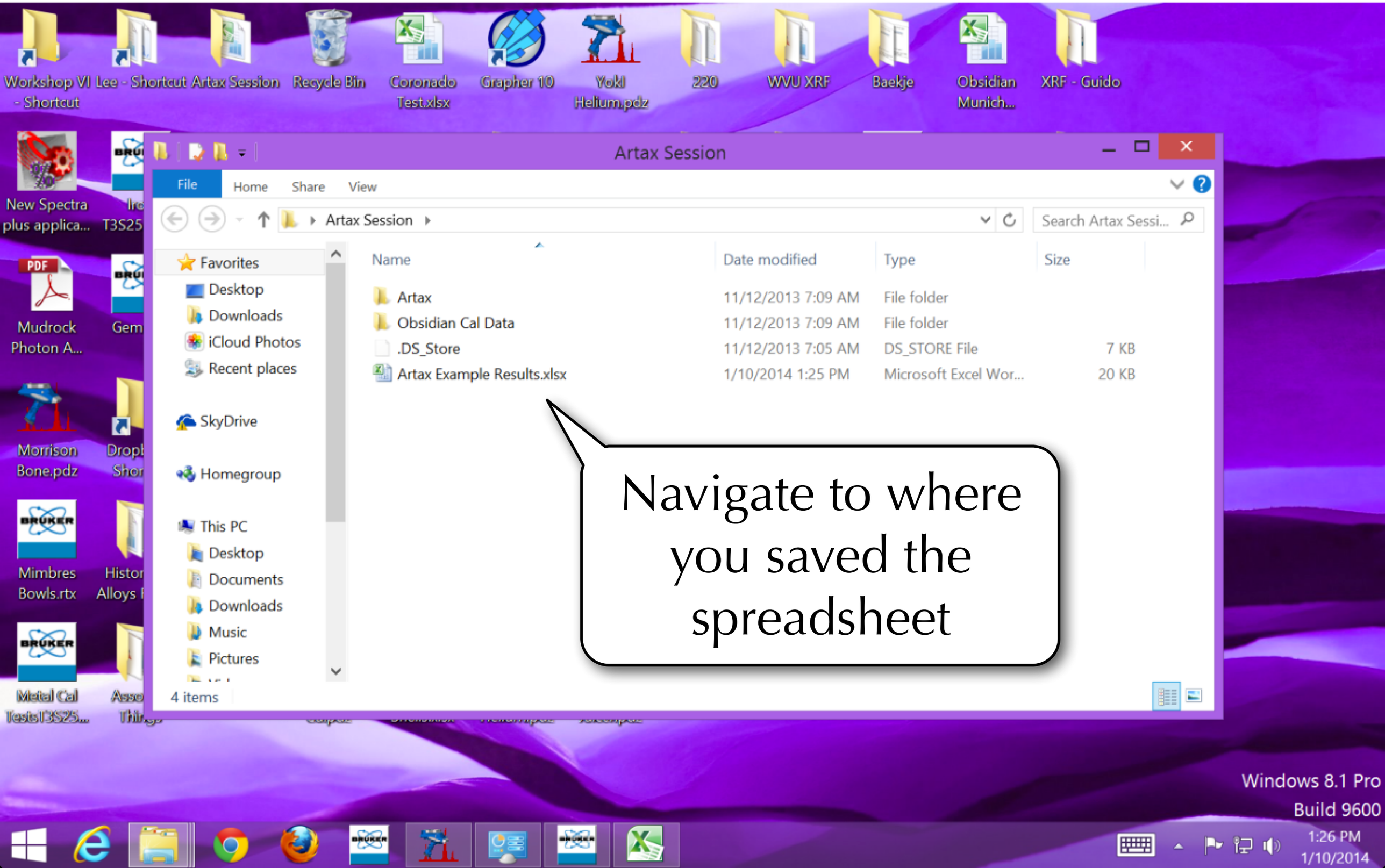
Your method will be applied to all data held in the ‘Points’ folder. This can be run on thousands of spectra at once



Bayesian Deconvolution



Bayesian Deconvolution



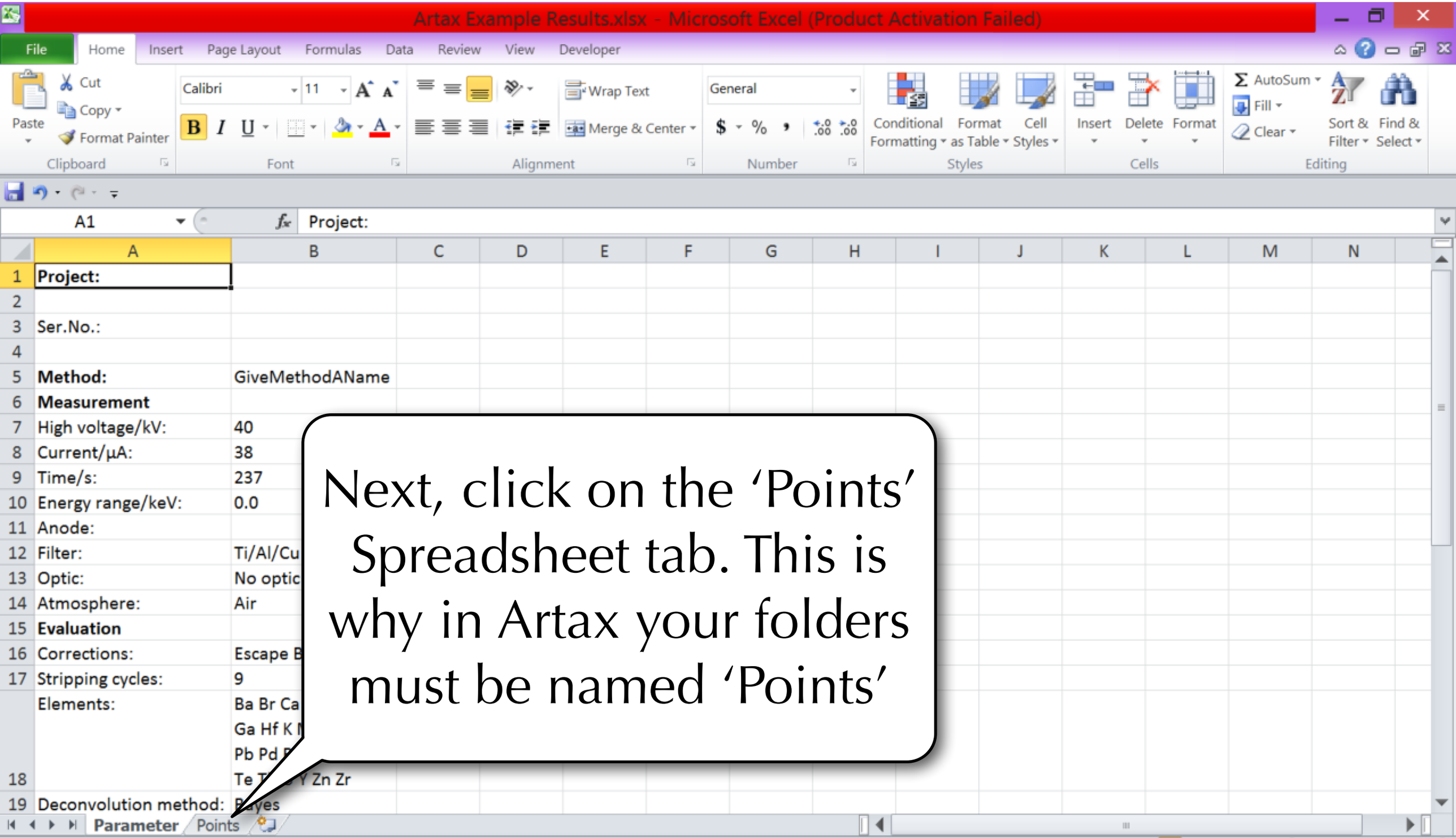
Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

	A	B
1	**Project:**	
2		
3	Ser.No.:	
4		
5	**Method:**	GiveMethodAName
6	**Measurement**	
7	High voltage/kV:	40
8	Current/µA:	38
9	Time/s:	237
10	Energy range/keV:	0.0
11	Anode:	
12	Filter:	Ti/Al/Cu
13	Optic:	No optic
14	Atmosphere:	Air
15	**Evaluation**	
16	Corrections:	Escape Backgr.
17	Stripping cycles:	9
	Elements:	Ba Br Ca Cr Cs Cu Fe
		Ga Hf K Mn Nb Ni
		Pb Pd Rb Rh Sn Sr
18		Te Th U Y Zn Zr
19	Deconvolution method:	Bayes

The first page will have technical details on the method you used

Bayesian Deconvolution



Next, click on the 'Points' Spreadsheet tab. This is why in Artax your folders must be named 'Points'

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins

Cut | Copy | Format Painter | Paste | Clipboard
Calibri | 11 | Font
Wrap Text | Merge & Center | Alignment
General | Number
Conditional Formatting | Format as Table | Cell Styles | Styles
Insert | Delete | Format | Cells
AutoSum | Fill | Clear | Sort & Filter | Find & Select | Editing

A1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1					Ba K12	Ba L1	Br K12	Ca K12	Cr K12	Cs K12	Cs L1	Cu K12	Fe K12	Ga K12	Hf L1	Hf M1	K K12
2				OB40Archibarca35@100114_093819	5026	513	131	1033	237	2348	-1	1191	24558	333	123	124	1485
3				OB40Basaltic_Plateau20@100114_093819	2191	2874	24	6490	273	2011	3	1389	180679	259	0	179	122
4				OB40Big_Southern_Butte06@100114_093819	1450	172	69	261	163	2029	1	1194	35256	549	171	86	1894
5				OB40Blue_Mountain04@100114_093819	5830	699	272	99	127	1585	1	1175	83709	476	1	139	1412
6				OB40Burns_Green15@100114_093819	2138	279	68	81	170	2103	0	1192	52218	223	77	107	1577
7				OB40Cannonball1_22@100114_093819	1590	395	218	227	101	2194	47	1340	69313	508	2	141	1820
8				OB40Casa_Diablo10@100114_093819	6278	549	25	586	202	2246	12	1228	26577	286	36	35	1880
9				OB40Cerro_del_Medio28@100114_093819	2121	280	108	92	143	2724	1	1242	21207	365	0	122	1842
10				OB40Chickahominy26@100114_093819										256	0	53	1674
11				OB40Cougar_Mountain29@100114_093819	6									312	72	100	1571
12				OB40Davis_Creek27@100114_093819	4									297	1	100	1885
13				OB40East_Medicine_lake12@100114_093819	4									299	-1	110	1725
14				OB40El_Paraiso24@100114_093819	1									587	2	154	1704
15				OB40El_Peceno40@100114_093819	6									369	4	63	1728
16				OB40Glass_Buttes03@100114_093819	6									300	2	182	1583
17				OB40Grasshopper_Flat13@100114_093819	4									292	37	176	1761
18				OB40Gregory_Creek38@100114_093819	11									261	8	24	1764
19				OB40Guadalupe_Victoria02@100114_093819	568									315	2	93	1532
20				OB40Inman_Creek14@100114_093819	5107	308	82	604	171	1623	1	1269	32541	331	8	147	1077
21				OB40KES_276_18@100114_093819	2547	1192	197	484	179	2592	1	1364	65141	465	6	21	2103
22				OB40KES_362_17@100114_093819	1526	631	342	89	172	1635	16	1255	162561	486	258	137	1883

Parameter | Points

Ready | 100%

1:28 PM
1/10/2014

You will see a list of your data from the ‘Points’ folder in

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1					Ba K12	Ba L1	Br K12	Ca K12	Cr K12	Cs K12	Cs L1	Cu K12	Fe K12	Ga K12	Hf L1	Hf M1	K K12
2				OB40Archibarca35@100114_093819	5026	513	131	1033	237	2348	-1	1191	24558	333	123	124	1485
3				OB40Basaltic_Plateau20@100114_093819	2191	2874	24	6490	273	2011	3	1389	180679	259	0	179	122
4				OB40Big_Southern_Butte06@100114_093819	1450	172	69	261	163	2029	1	1194	35256	549	171	86	1894
5				OB40Blue_Mountain04@100114_093819	5830	690	272	99	127	1585	1	1175	83709	476	1	139	1412
6				OB40Burns_Green15@100114_093819	2138												577
7				OB40Cannonball1_22@100114_093819	1590												820
8				OB40Casa_Diablo10@100114_093819	6278												880
9				OB40Cerro_del_Medio28@100114_093819	2121												842
10				OB40Chickahominy26@100114_093819	7348												674
11				OB40Cougar_Mountain29@100114_093819	6992												571
12				OB40Davis_Creek27@100114_093819	4296												885
13				OB40East_Medicine_lake12@100114_093819	4404												725
14				OB40El_Paraiso24@100114_093819	1674												704
15				OB40El_Peceno40@100114_093819	6543												728
16				OB40Glass_Buttes03@100114_093819	6634												583
17				OB40Grasshopper_Flat13@100114_093819	4884	660	120	683	174	2058	1	1311	27492	292	37	176	1761
18				OB40Gregory_Creek38@100114_093819	11648	418	182	746	160	2382	1	1267	18732	261	8	24	1764
19				OB40Guadalupe_Victoria02@100114_093819	5688	362	72	412	88	1937	11	1304	12993	315	2	93	1532
20				OB40Inman_Creek14@100114_093819	5107	308	82	604	171	1623	1	1269	32541	331	8	147	1077
21				OB40KES_276_18@100114_093819	2547	1192	197	484	179	2592	1	1364	65141	465	6	21	2103
22				OB40KES_362_17@100114_093819	1526	631	342	89	172	1635	16	1255	162561	486	258	137	1883

As columns, you will see the K, L, and sometimes M shell peak summaries of your spectra

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins

Cut | Copy | Format Painter | Paste | Clipboard
Calibri | 11 | Font
Wrap Text | Merge & Center | Alignment
General | Number
Conditional Formatting | Format as Table | Cell Styles | Styles
Insert | Delete | Format | Cells
AutoSum | Fill | Clear | Sort & Filter | Find & Select | Editing

A1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1					Ba K12	Ba L1	Br K12	Ca K12	Cr K12	Cs K12	Cs L1	Cu K12	Fe K12	Ga K12	Hf L1	Hf M1	K K12
2				OB40Archibarca35@100114_093819	5026	513	131	1033	237	2348	-1	1191	24558	333	123	124	1485
3				OB40Basaltic_Plateau20@100114_093819	2191	2874	24	6490	273	2011	3	1389	180679	259	0	179	122
4				OB40Big_Southern_Butte06@100114_093819	1450	172	69	261	163	2029	1	1194	35256	549	171	86	1894
5				OB40Blue_Mountain04@100114_093819	5830	699	272	99	127	1585	1	1175	83709	476	1	139	1412
6														223	77	107	1577
7													313	508	2	141	1820
8													26577	286	36	35	1880
9													21207	365	0	122	1842
10													33724	256	0	53	1674
11													23675	312	72	100	1571
12													15340	297	1	100	1885
13													29760	299	-1	110	1725
14													67390	587	2	154	1704
15													18034	369	4	63	1728
16													18446	300	2	182	1583
17													27492	292	37	176	1761
18													18732	261	8	24	1764
19													12993	315	2	93	1532
20													32541	331	8	147	1077
21				OB40KES_276_18@100114_093819	2547	1192	197	484	179	2592	1	1364	65141	465	6	21	2103
22				OB40KES_362_17@100114_093819	1526	631	342	89	172	1635	16	1255	162561	486	258	137	1883

These numbers are the Net Count Rates for each element, in essence, the number of photons for each element after removing other elemental interference and background

Parameter | Points

Ready | 100%

1:28 PM
1/10/2014

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins

D2: OB40Archibarca35@100114_093819

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1					Ba K12	Ba L1	Br K12	Ca K12	Cr K12	Cs K12	Cs L1	Cu K12	Fe K12	Ga K12	Hf L1	Hf M1	K K12
2				OB40Archibarca35@100114_093819	5026	513	131	1033	237	2348	-1	1191	24558	333	123	124	1485
3				OB40Basaltic_Plateau20@100114_093819	2191	2874	24	6490	273	2011	3	1389	180679	259	0	179	122
4				OB40Big_Southern_Butte06@100114_093815	1450	172	69	261	163	2029	1	1194	35256	549	171	86	1894
5				OB40Blue_Mountain04@100114_093819										476	1	139	1412
6				OB40Burns_Green15@100114_093819										223	77	107	1577
7				OB40Cannonball1_22@100114_093819										508	2	141	1820
8				OB40Casa_Diablo10@100114_093819										286	36	35	1880
9				OB40Cerro_del_Medio28@100114_093819										365	0	122	1842
10				OB40Chickahominy26@100114_093819										256	0	53	1674
11				OB40Cougar_Mountain29@100114_093819										312	72	100	1571
12				OB40Davis_Creek27@100114_093819										297	1	100	1885
13				OB40East_Medicine_lake12@100114_093819										299	-1	110	1725
14				OB40El_Paraiso24@100114_093819	1674	304	165	-1	82	2876	1	1270	57390	587	2	154	1704
15				OB40El_Peceno40@100114_093819	6543	323	30	787	106	2132	1	1241	18034	369	4	63	1728
16				OB40Glass_Buttes03@100114_093819	6634	366	19	554	125	1783	1	1262	18446	300	2	182	1583
17				OB40Grasshopper_Flat13@100114_093819	4884	660	120	683	174	2058	1	1311	27492	292	37	176	1761
18				OB40Gregory_Creek38@100114_093819	11648	418	182	746	160	2382	1	1267	18732	261	8	24	1764
19				OB40Guadalupe_Victoria02@100114_093819	5688	362	72	412	88	1937	11	1304	12993	315	2	93	1532
20				OB40Inman_Creek14@100114_093819	5107	308	82	604	171	1623	1	1269	32541	331	8	147	1077
21				OB40KES_276_18@100114_093819	2547	1192	197	484	179	2592	1	1364	65141	465	6	21	2103
22				OB40KES_362_17@100114_093819	1526	631	342	89	172	1635	16	1255	162561	486	258	137	1883

Parameter | Points

To clean up the data a little, select the @number_number text

Edit

1:28 PM
1/10/2014

Bayesian Deconvolution

Go to ‘Find and Select’ and choose ‘Replace’

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1									Cr K12	Cs K12	Cs L1	Cu K12	Fe K12	Ga				
2			OB40Archibar						237	2348	-1	1191	24558					
3			OB40Basaltic_						273	2011	3	1389	180679					
4			OB40Big_Sout						163	2029	1	1194	35256					
5			OB40Blue_Mo						127	1585	1	1175	83709					
6			OB40Burns_Green15@100114_093819	2138	279	68	81	170	2103	0	1192	52218						
7			OB40Cannonball1_22@100114_093819	1590	395	218	227	101	2194	47	1340	69313						
8			OB40Casa_Diablo10@100114_093819	6278	549	25	586	202	2246	12	1228	26577						
9			OB40Cerro_del_Medio28@100114_093819	2121	280	108	92	143	2724	1	1242	21207	365	0	122	1842		
10			OB40Chickahominy26@100114_093819	7348	577	162	368	154	1602	17	1183	33724	256	0	53	1674		
11			OB40Cougar_Mountain29@100114_093819	6992	317	171	427	100	2507	1	1395	23675	312	72	100	1571		
12			OB40Davis_Creek27@100114_093819	4296	220	1	589	128	2482	1	1390	15340	297	1	100	1885		
13			OB40East_Medicine_lake12@100114_093819	4404	770	94	634	149	1890	0	1298	29760	299	-1	110	1725		
14			OB40El_Paraiso24@100114_093819	1674	304	165	-1	82	2876	1	1270	57390	587	2	154	1704		
15			OB40El_Peceno40@100114_093819	6543	323	30	787	106	2132	1	1241	18034	369	4	63	1728		
16			OB40Glass_Buttes03@100114_093819	6634	366	19	554	125	1783	1	1262	18446	300	2	182	1583		
17			OB40Grasshopper_Flat13@100114_093819	4884	660	120	683	174	2058	1	1311	27492	292	37	176	1761		
18			OB40Gregory_Creek38@100114_093819	11648	418	182	746	160	2382	1	1267	18732	261	8	24	1764		
19			OB40Guadalupe_Victoria02@100114_093819	5688	362	72	412	88	1937	11	1304	12993	315	2	93	1532		
20			OB40Inman_Creek14@100114_093819	5107	308	82	604	171	1623	1	1269	32541	331	8	147	1077		
21			OB40KES_276_18@100114_093819	2547	1192	197	484	179	2592	1	1364	65141	465	6	21	2103		
22			OB40KES_362_17@100114_093819	1526	631	342	89	172	1635	16	1255	162561	486	258	137	1883		

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins

Cut | Copy | Format Painter | Paste | Clipboard
Calibri | 11 | Font
Wrap Text | Merge & Center | Alignment
General | Number
Conditional Formatting | Format as Table | Cell Styles | Styles
Insert | Delete | Format | Cells
AutoSum | Fill | Clear | Sort & Filter | Find & Select | Editing

D2: OB40Archibarca35@100114_093819

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1					Ba K12	Ba L1	Br K12	Ca K12	Cr K12	Cs K12	Cs L1	Cu K12	Fe K12	Ga K12	Hf L1	Hf M1	K K12
2				OB40Archibarca35@100114_093819	5026	513	131	1033	237	2348	-1	1191	24558	333	123	124	1485
3				OB40Basaltic_Plateau20@100114_093819	2191	2874	24	6490	273	2011	3	1389	180679	259	0	179	122
4				OB40Big_Southern_Butte06@100114_093819	1450	172	69	261	163	2029	1	1194	35256	549	171	86	1894
5				OB40Blue_Mountain04@100114_093819	5830	699	272	99	127	1585	1	1175	83709	476	1	139	1412
6				OB40Burns_Green15@100114_									52218	223	77	107	1577
7				OB40Cannonball1_22@100114									69313	508	2	141	1820
8				OB40Casa_Diablo10@100114_									26577	286	36	35	1880
9				OB40Cerro_del_Medio28@100									21207	365	0	122	1842
10				OB40Chickahominy26@100114									33724	256	0	53	1674
11				OB40Cougar_Mountain29@10									23675	312	72	100	1571
12				OB40Davis_Creek27@100114_												100	1885
13				OB40East_Medicine_lake12@1												10	1725
14				OB40El_Paraiso24@100114_09												54	1704
15				OB40El_Peceno40@100114_09												63	1728
16				OB40Glass_Buttes03@100114_093819	6634	366	19									82	1583
17				OB40Grasshopper_Flat13@100114_093819	4884	660	120									76	1761
18				OB40Gregory_Creek38@100114_093819	11648	418	182									24	1764
19				OB40Guadalupe_Victoria02@100114_093819	5688	362	72									93	1532
20				OB40Inman_Creek14@100114_093819	5107	308	82									47	1077
21				OB40KES_276_18@100114_093819	2547	1192	197									21	2103
22				OB40KES_362_17@100114_093819	1526	631	342	89	172	1635	16	1255	162561	486	258	137	1883

Parameter | Points

Edit | 100%

Find and Replace

Find | Replace

Find what: @100114_093819

Replace with:

Replace All | Replace | Find

Paste the @number_number text

1:30 PM
1/10/2014

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins

Cut | Copy | Format Painter | Paste | Clipboard
Calibri | 11 | Font
Wrap Text | Merge & Center | Alignment
General | Number
Conditional Formatting | Format as Table | Cell Styles | Styles
Insert | Delete | Format | Cells
AutoSum | Fill | Clear | Sort & Filter | Find & Select | Editing

D2: OB40Archibarca35@100114_093819

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1					Ba K12	Ba L1	Br K12	Ca K12	Cr K12	Cs K12	Cs L1	Cu K12	Fe K12	Ga K12	Hf L1	Hf M1	K K12
2				OB40Archibarca35@100114_093819	5026	513	131	1033	237	2348	-1	1191	24558	333	123	124	1485
3				OB40Basaltic_Plateau20@100114_093819	2191	2874	24	6490	273	2011	3	1389	180679	259	0	179	122
4				OB40Big_Southern_Butte06@100114_093819	1450	172	69	261	163	2029	1	1194	35256	549	171	86	1894
5				OB40Blue_Mountain04@100114_093819	5830	699	272	99	127	1585	1	1175	83709	476	1	139	1412
6				OB40Burns_Green15@100114_									52218	223	77	107	1577
7				OB40Cannonball1_22@100114									69313	508	2	141	1820
8				OB40Casa_Diablo10@100114_									26577	286	36	35	1880
9				OB40Cerro_del_Medio28@100									21207	365	0	122	1842
10				OB40Chickahominy26@100114									33724	256	0	53	1674
11				OB40Cougar_Mountain29@10									23675	312	72	100	1571
12				OB40Davis_Creek27@100114_									15340	297	1	100	1885
13				OB40East_Medicine_lake12@1										299	-1	110	1725
14				OB40El_Paraiso24@100114_09											2	154	1704
15				OB40El_Peceno40@100114_09											4	63	1728
16				OB40Glass_Buttes03@100114_093819	6634										2	182	1583
17				OB40Grasshopper_Flat13@100114_093819	4884										37	176	1761
18				OB40Gregory_Creek38@100114_093819	11648										8	24	1764
19				OB40Guadalupe_Victoria02@100114_093819	5688	362	72	412	88	1937	11	1304	12993	315	2	93	1532
20				OB40Inman_Creek14@100114_093819	5107	308	82	604	171	1623	1	1269	32541	331	8	147	1077
21				OB40KES_276_18@100114_093819	2547	1192	197	484	179	2592	1	1364	65141	465	6	21	2103
22				OB40KES_362_17@100114_093819	1526	631	342	89	172	1635	16	1255	162561	486	258	137	1883

Find and Replace

Find | Replace

Find what: @100114_093819

Replace with:

Options >>

Replace All | Replace

And replace it with nothing

Parameter | Points

Edit

100%

1:30 PM
1/10/2014

Bayesian Deconvolution

This will simplify your file names

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

OB40Basaltic_Plateau20

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1					Ba K12	Ba L1	Br K12	Ca K12	Cr K12	Cs K12	Cs L1	Cu K12	Fe K12	Ga K12	Hf L1	Hf M1	K K12
2				OB40Archibarca35	5026	513	131	1033	237	2348	-1	1191	24558	333	123	124	1485
3				OB40Basaltic_Plateau20	2191	2874	24	6490	273	2011	3	1389	180679	259	0	179	122
4				OB40Big_Southern_Butte06	1450	172	69	261	163	2029	1	1194	35256	549	171	86	1894
5				OB40Blue_Mountain04	5830	699	272	99	127	1585	1	1175	83709	476	1	139	1412
6				OB40Burns_Green15									52218	223	77	107	1577
7				OB40Cannonball1_22									69313	508	2	141	1820
8				OB40Casa_Diablo10									26577	286	36	35	1880
9				OB40Cerro_del_Medio28									21207	365	0	122	1842
10				OB40Chickahominy26									33724	256	0	53	1674
11				OB40Cougar_Mountain29									23675	312	72	100	1571
12				OB40Davis_Creek27									15340	297	1	100	1885
13				OB40East_Medicine_lake12									29760	299	-1	110	1725
14				OB40El_Paraiso24									57390	587	2	154	1704
15				OB40El_Peceno40									18034	369	4	63	1728
16				OB40Glass_Buttes03	6634	366	19	554	125	1783	1	1262	18446	300	2	182	1583
17				OB40Grasshopper_Flat13	4884	660	120	683	174	2058	1	1311	27492	292	37	176	1761
18				OB40Gregory_Creek38	11648	418	182	746	160	2382	1	1267	18732	261	8	24	1764
19				OB40Guadalupe_Victoria02	5688	362	72	412	88	1937	11	1304	12993	315	2	93	1532
20				OB40Inman_Creek14	5107	308	82	604	171	1623	1	1269	32541	331	8	147	1077
21				OB40KES_276_18	2547	1192	197	484	179	2592	1	1364	65141	465	6	21	2103
22				OB40KES_362_17	1526	631	342	89	172	1635	16	1255	162561	486	258	137	1883

Microsoft Excel

Excel has completed its search and has made 40 replacements.

OK

Options >>

Replace All | Replace | Find All | Find Next | Close

Parameter | Points

Ready

1:32 PM
1/10/2014

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins

Cut | Copy | Format Painter | Paste | Calibri | 11 | Wrap Text | Merge & Center | General | Conditional Formatting | Format as Table | Cell Styles | Insert | Delete | Format | AutoSum | Fill | Clear | Sort & Filter | Find & Select

Clipboard | Font | Alignment | Number | Styles | Cells | Editing

D1 | Data Source

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1				Data Source	Ba K12	Ba L1	Br K12	Ca K12	Cr K12	Cs K12	Cs L1	Cu K12	Fe K12	Ga K12	Hf L1	Hf M1	K K12
2				OB40Archibarca35	5026	513	131	1033	237	2348	-1	1191	24558	333	123	124	1485
3				OB40Basaltic_Plateau20												179	122
4				OB40Big_Southern_Butte06												86	1894
5				OB40Blue_Mountain04												139	1412
6				OB40Burns_Green15												107	1577
7				OB40Cannonball1_22												141	1820
8				OB40Casa_Diablo10												35	1880
9				OB40Cerro_del_Medio28												122	1842
10				OB40Chickahominy26												53	1674
11				OB40Cougar_Mountain29												100	1571
12				OB40Davis_Creek27	4296	220	1	589	128	2482	1	1390	15340	297	1	100	1885
13				OB40East_Medicine_lake12	4404	770	94	634	149	1890	0	1298	29760	299	-1	110	1725
14				OB40El_Paraiso24	1674	304	165	-1	82	2876	1	1270	57390	587	2	154	1704
15				OB40El_Peceno40	6543	323	30	787	106	2132	1	1241	18034	369	4	63	1728
16				OB40Glass_Buttes03	6634	366	19	554	125	1783	1	1262	18446	300	2	182	1583
17				OB40Grasshopper_Flat13	4884	660	120	683	174	2058	1	1311	27492	292	37	176	1761
18				OB40Gregory_Creek38	11648	418	182	746	160	2382	1	1267	18732	261	8	24	1764
19				OB40Guadalupe_Victoria02	5688	362	72	412	88	1937	11	1304	12993	315	2	93	1532
20				OB40Inman_Creek14	5107	308	82	604	171	1623	1	1269	32541	331	8	147	1077
21				OB40KES_276_18	2547	1192	197	484	179	2592	1	1364	65141	465	6	21	2103
22				OB40KES_362_17	1526	631	342	89	172	1635	16	1255	162561	486	258	137	1883

Give a name to the column with your data names, this will help with plotting

Parameter | Points

Ready | 100%

1:33 PM
1/10/2014

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins

Cut | Copy | Format Painter | Paste | Clipboard
Calibri | 11 | Font
Wrap Text | Merge & Center | Alignment
General | Number
Conditional Formatting | Format as Table | Cell Styles | Styles
Insert | Delete | Format | Cells
AutoSum | Fill | Clear | Sort & Filter | Find & Select | Editing

N1 | Ga K12

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1				Data Source	Ba K12	Ba L1	Br K12	Ca K12	Cr K12	Cs K12	Cs L1	Cu K12	Fe K12	Ga K12	Hf L1	Hf M1	K K12
2				OB40Archibarca35	5026	513	131	1033	237	2348	-1	1191	24558	333	123	124	1485
3				OB40Basaltic_Plateau20	2191	2874	24	6490	273	2011	3	1389	180679	259	0	179	122
4				OB40Big_Southern_Butte06	1450	172	69	261	163	2029	1	1194	35256	549	171	86	1894
5				OB40Blue_Mountain04	5830	699	272	99	127	1585	1	1175	83709	476	1	139	1412
6				OB40Burns_Green15	2138	279	68	81	170	2103	0	1192	52218	223	77	107	1577
7				OB40Cannonball1_22	1590	395	218	227	101	2194	47	1340	69313	508	2	141	1820
8				OB40Casa_Diablo10	6278	549	25	586	202	2246	12	1228	26577	286	36	35	1880
9				OB40Cerro_del_Medio28	2121	280	108	92	143	2724	1	1242	21207	365	0	122	1842
10				OB40Chickahominy26	7348	577	162	368	154	1602	17	1183	33724	256	0	53	1674
11				OB40Cougar_Mountain29	6992	317	171	427	100	2507	1	1395	23675	312	72	100	1571
12				OB40Davis_Creek27	4296	220	1	589	28	2482	1	1390	15340	297	1	100	1885
13				OB40East_Medicine_lake1									29760	299	-1	110	1725
14				OB40El_Paraiso24							1	1270	57390	587	2	154	1704
15				OB40El_Peceno40							1	1241	18034	369	4	63	1728
16				OB40Glass_Buttes03							1	1262	18446	300	2	182	1583
17				OB40Grasshopper_Flat13							1	1311	27492	292	37	176	1761
18				OB40Gregory_Creek38							1	1267	18732	261	8	24	1764
19				OB40Guadalupe_Victoria0							11	1304	12993	315	2	93	1532
20				OB40Inman_Creek14							1	1269	32541	331	8	147	1077
21				OB40KES_276_18							1	1364	65141	465	6	21	2103
22				OB40KES_362_17	1526	631	342	89	172	1635	16	1255	162561	486	258	137	1883

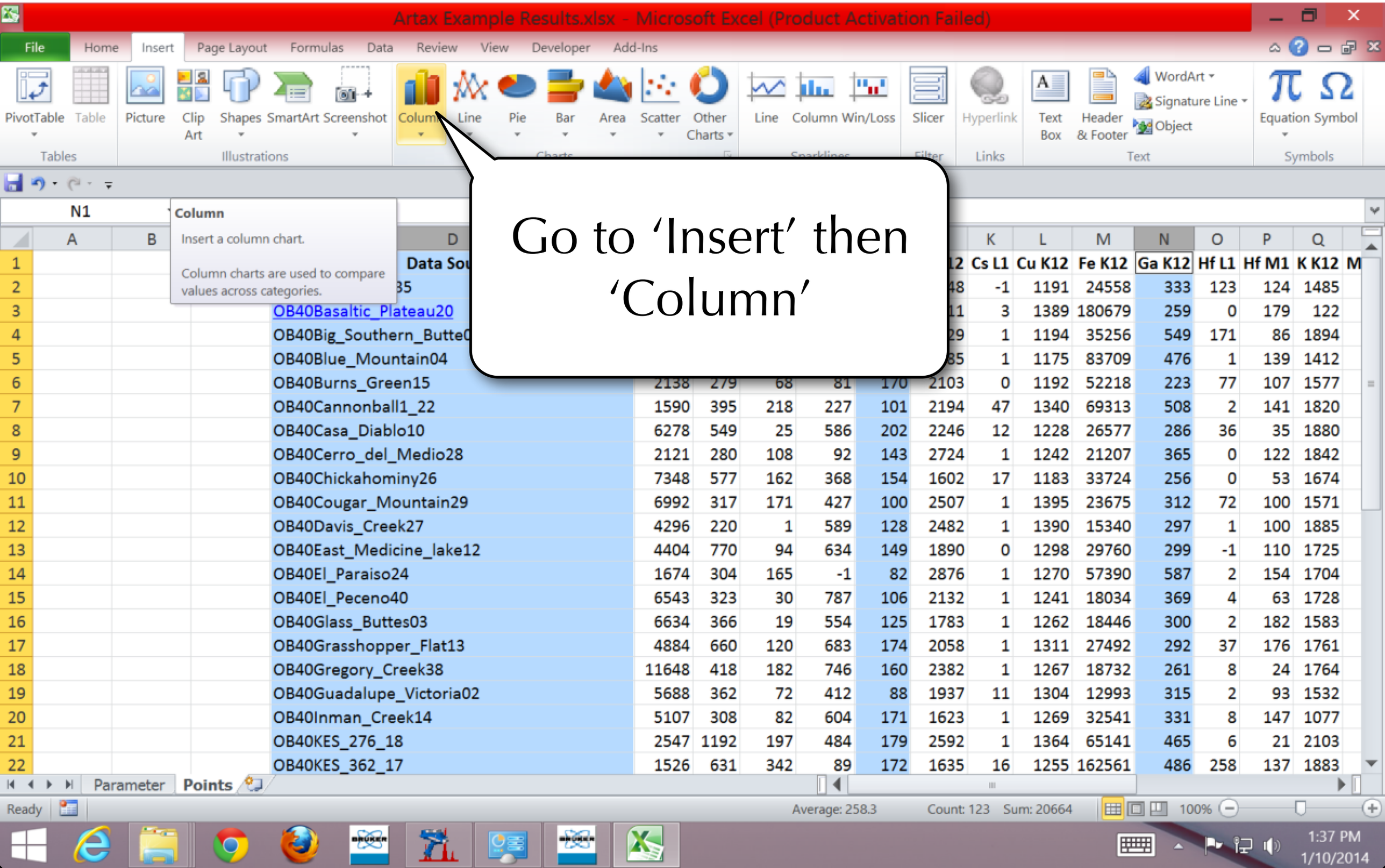
Then, select the names and elements you want to compare

Parameter | Points

Ready | Average: 258.3 | Count: 123 | Sum: 20664 | 100%

1:38 PM
1/10/2014

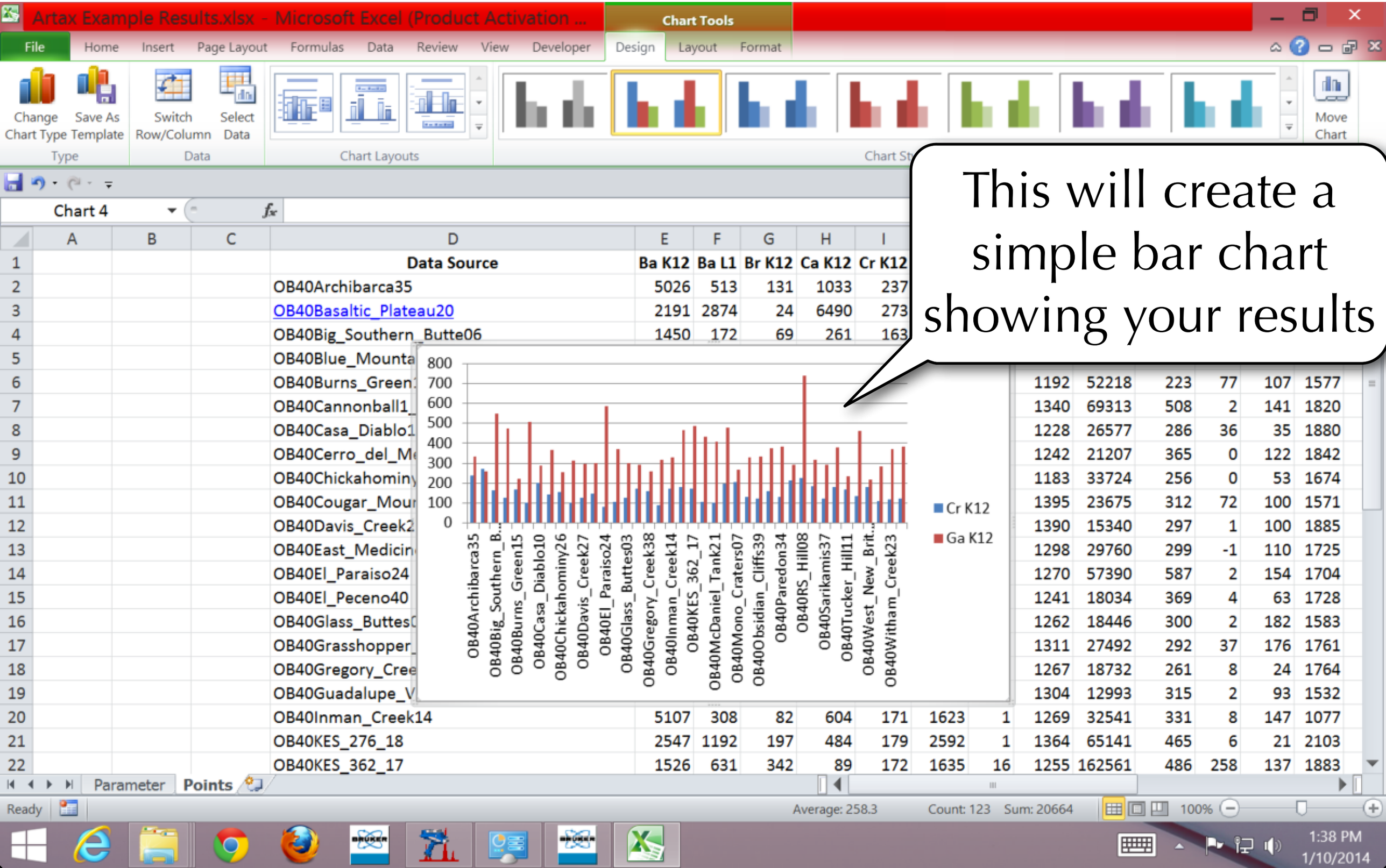
Bayesian Deconvolution



	A	B	D	K	L	M	N	O	P	Q
1			Data Sou	12	Cs L1	Cu K12	Fe K12	Ga K12	Hf L1	Hf M1	K K12	M
2			35	48	-1	1191	24558	333	123	124	1485	
3			OB40Basaltic_Plateau20	11	3	1389	180679	259	0	179	122	
4			OB40Big_Southern_Butte0	29	1	1194	35256	549	171	86	1894	
5			OB40Blue_Mountain04	85	1	1175	83709	476	1	139	1412	
6			OB40Burns_Green15	2103	0	1192	52218	223	77	107	1577	
7			OB40Cannonball1_22	2194	47	1340	69313	508	2	141	1820	
8			OB40Casa_Diablo10	2246	12	1228	26577	286	36	35	1880	
9			OB40Cerro_del_Medio28	2724	1	1242	21207	365	0	122	1842	
10			OB40Chickahominy26	1602	17	1183	33724	256	0	53	1674	
11			OB40Cougar_Mountain29	2507	1	1395	23675	312	72	100	1571	
12			OB40Davis_Creek27	2482	1	1390	15340	297	1	100	1885	
13			OB40East_Medicine_lake12	1890	0	1298	29760	299	-1	110	1725	
14			OB40El_Paraiso24	2876	1	1270	57390	587	2	154	1704	
15			OB40El_Peceno40	2132	1	1241	18034	369	4	63	1728	
16			OB40Glass_Buttes03	1783	1	1262	18446	300	2	182	1583	
17			OB40Grasshopper_Flat13	2058	1	1311	27492	292	37	176	1761	
18			OB40Gregory_Creek38	2382	1	1267	18732	261	8	24	1764	
19			OB40Guadalupe_Victoria02	1937	11	1304	12993	315	2	93	1532	
20			OB40Inman_Creek14	1623	1	1269	32541	331	8	147	1077	
21			OB40KES_276_18	2592	1	1364	65141	465	6	21	2103	
22			OB40KES_362_17	1635	16	1255	162561	486	258	137	1883	

	D	E	F	G	H	I
6	2138	279	68	81	170	
7	1590	395	218	227	101	
8	6278	549	25	586	202	
9	2121	280	108	92	143	
10	7348	577	162	368	154	
11	6992	317	171	427	100	
12	4296	220	1	589	128	
13	4404	770	94	634	149	
14	1674	304	165	-1	82	
15	6543	323	30	787	106	
16	6634	366	19	554	125	
17	4884	660	120	683	174	
18	11648	418	182	746	160	
19	5688	362	72	412	88	
20	5107	308	82	604	171	
21	2547	1192	197	484	179	
22	1526	631	342	89	172	

Bayesian Deconvolution



This will create a simple bar chart showing your results

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins

PivotTable | Table | Picture | Clip Art | Shapes | SmartArt | Screenshot | Column | Line | Pie | Bar | Area | Scatter | Other Charts | Line | Column | Win/Loss | Slicer | Hyperlink | Text Box | Header & Footer | WordArt | Signature Line | Object | Equation | Symbol

Tables | Illustrations | Charts | Sparklines | Filter | Links | Text | Symbols

AH1 | Th L1

	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO
1	K K12	Mn K12	Nb K12	Ni K12	Pb L1	Pb M1	Pd K12	Pd L1	Rb K12	Rh K12	Rh L1	Sn K12	Sn L1	Sr K12	Sr L1	Te K12	Te L1	Th L1	Th M1	U L1	U M1	Y K12	Zn K12	Zr K12	
2	1485	1129	1628	101	503	126	54600	682	7365	5423	0	6041	0	24721	119	2206	0	549	2	0	0	1169	851	10189	
3	122	1841	361	515	96											1675	1	29	-2	8	14	793	1167	4340	
4	1894	534	31448	65	1521										139	1926	0	804	0	186	0	19059	3635	29868	
5	1412	3006	1816	1	486										153	1811	15	297	30	1	0	5631	2122	34642	
6	1577	939	4709	58	865										15	1864	86	473	7	33	51	6977	1839	63315	
7	1820	847	10880	10	1053										0	2014	1	1387	0	0	0	8998	2796	104283	
8	1880	624	1080	20	739										119	2209	15	576	1	15	0	819	616	18235	
9	1842	740	5904	39	586										175	1999	1	704	0	174	0	3735	1017	15608	
10	1674	737	2100	10	1016										135	1676	0	427	0	-1	0	4509	992	29501	
11	1571	588	1360	87	409										224	2496	-1	354	0	2	0	4325	1136	12090	
12	1885	683	993	1	546	125	55572	791	7872	4671	1	5894	1	5233	0	2565	-1	572	0	0	0	993	665	8234	
13	1725	688	836	17	654	84	54951	553	9653	5729	65	5586	0	5912	171	2231	0	640		80	0	2022	634	19522	
14	1704	428	5537	1	717	167	50745												0	0	0	14820	3290	115478	
15	1728	1519	2406	53	841	150	55979										13	567	0	188	0	378	954	11461	
16	1583	638	774	22	386	109	55569										0	442	0	10	0	1923	644	8849	
17	1761	529	758	141	613	101	54335										1	653	0	32	0	2036	647	17232	
18	1764	1150	1121	31	525	43	55181										-1	217	0	31	0	1726	813	5142	
19	1532	966	1121	19	465	157	57969										0	467	33	40	0	907	719	6450	
20	1077	1086	707	98	364	116	55794										1	308	2	6	0	1186	896	8967	
21	2103	1913	26064	29	487	154	48128										0	1173	0	128	0	6403	1828	101268	
22	1883	3372	47011	1	1152	122	40656										1	2197	3	169	0	25929	6339	241913	

Here we have Thorium and Uranium

Uranium was only a small change in the spectra fitting

Parameter | Points

Ready | Average: 394.925 | Count: 82 | Sum: 31594 | 100%

1:39 PM 1/10/2014

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins

PivotTable | Table | Picture | Clip Art | Shapes | SmartArt | Screenshot | Column | Line | Pie | Bar | Area | Scatter | Other Charts | Line | Column | Win/Loss | Slicer | Hyperlink | Text Box | Header & Footer | WordArt | Signature Line | Object | Equation | Symbol

Tables | Illustrations | Charts | Sparklines | Filter | Links | Text | Symbols

AH1 | Th L1

	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO
1	K K12	Mn K12	Nb K12	Ni K12	Pb L1	Pb M1	Pd K12	Pd L1	Rb K12	Rh K12	Rh L1	Sn K12	Sn L1	Sr K12	Sr L1	Te K12	Te L1	Th L1	Th M1	U L1	U M1	Y K12	Zn K12	Zr K12	
2	1485	1129	1628	101	503	126	54600	682	7365	5423	0	6041	0	24721	119	2206	0	549	2	0	0	1169	851	10189	
3	122	1841	361	515	96	107	41099	452	385	5122	90	4768	13	16084	76	1675	1	29	-2	8	14	793	1167	4340	
4	1894																0	804	0	186	0	19059	3635	29868	
5	1412															1811	15	297	30	1	0	5631	2122	34642	
6	1577														15	1864	86	473	7	33	51	6977	1839	63315	
7	1820														0	2014	1	1387	0	0	0	8998	2796	104283	
8	1880														119	2209	15	576	1	15	0	819	616	18235	
9	1842														175	1999	1	704	0	174	0	3735	1017	15608	
10	1674														135	1676	0	427	0	-1	0	4509	992	29501	
11	1571														224	2496	-1	354	0	2	0	4325	1136	12090	
12	1885														0	2565	-1	572	0	0	0	993	665	8234	
13	1725														171	2231	0	640	32	80	0	2022	634	19522	
14	1704	428	5537	1	717	167	50745	619	14813	5178	0	6587	-1	18	140	1813	1	1197	0	0	0	14820	3290	115478	
15	1728	1519	2406	53	841	150	55979	574	15195	5639	0	5802	0	23946	67	2157	13	567	0	188	0	378	954	11461	
16	1583	638	774	22	386	109	55569	766	6751	5739	0	5795	1	5497	45	2046	0	442	0	10	0	1923	644	8849	
17	1761	529	758	141	613	101	54335	690	9336	5668	65	6285	0	5550	117	2008	1	653	0	32	0	2036	647	17232	
18	1764	1150	1121	31	525	43	55181	705	5006	5022	1	6022	0	11904	107	1883	-1	217	0	31	0	1726	813	5142	
19	1532	966	1121	19	465	157	57969	836	6856	5743	1	6230	1	5380	205	2434	0	467	33	40	0	907	719	6450	
20	1077	1086	707	98	364	116	55794	548	5649	4921	4	6200	0	12138	104	1984	1	308	2	6	0	1186	896	8967	
21	2103	1913	26064	29	487	154	48128	555	13211	5030	0	6008	1	3799	76	1785	0	1173	0	128	0	6403	1828	101268	
22	1883	3372	47011	1	1152	122	40656	523	24060	4534	13	5218	0	238	139	1248	1	2197	3	169	0	25929	6339	241913	

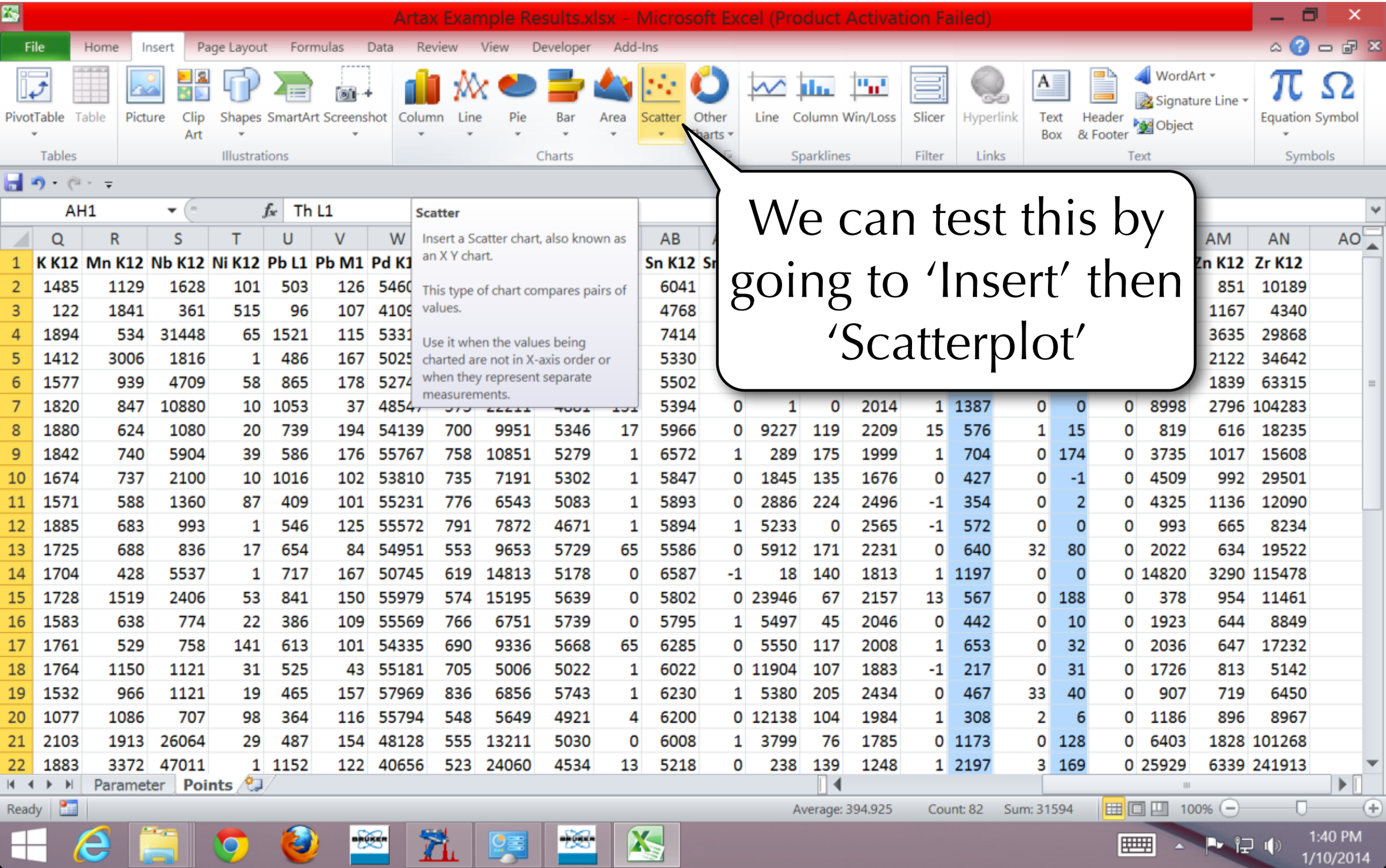
However, these two elements are related, more Uranium should result in more Thorium

Parameter | Points

Ready | Average: 394.925 | Count: 82 | Sum: 31594 | 100%

1:39 PM
1/10/2014

Bayesian Deconvolution



	Q	R	S	T	U	V	W	AB	AM	AN	AO
1	K K12	Mn K12	Nb K12	Ni K12	Pb L1	Pb M1	Pd K1	Sn K12	Zn K12	Zr K12	
2	1485	1129	1628	101	503	126	5460	6041	851	10189	
3	122	1841	361	515	96	107	4109	4768	1167	4340	
4	1894	534	31448	65	1521	115	5331	7414	3635	29868	
5	1412	3006	1816	1	486	167	5025	5330	2122	34642	
6	1577	939	4709	58	865	178	5274	5502	1839	63315	
7	1820	847	10880	10	1053	37	4854	5394	2796	104283	
8	1880	624	1080	20	739	194	54139	700	9951	5346	17	5966	0	9227	119	2209	15	576	1	15	0	819	616	18235
9	1842	740	5904	39	586	176	55767	758	10851	5279	1	6572	1	289	175	1999	1	704	0	174	0	3735	1017	15608
10	1674	737	2100	10	1016	102	53810	735	7191	5302	1	5847	0	1845	135	1676	0	427	0	-1	0	4509	992	29501
11	1571	588	1360	87	409	101	55231	776	6543	5083	1	5893	0	2886	224	2496	-1	354	0	2	0	4325	1136	12090
12	1885	683	993	1	546	125	55572	791	7872	4671	1	5894	1	5233	0	2565	-1	572	0	0	0	993	665	8234
13	1725	688	836	17	654	84	54951	553	9653	5729	65	5586	0	5912	171	2231	0	640	32	80	0	2022	634	19522
14	1704	428	5537	1	717	167	50745	619	14813	5178	0	6587	-1	18	140	1813	1	1197	0	0	0	14820	3290	115478
15	1728	1519	2406	53	841	150	55979	574	15195	5639	0	5802	0	23946	67	2157	13	567	0	188	0	378	954	11461
16	1583	638	774	22	386	109	55569	766	6751	5739	0	5795	1	5497	45	2046	0	442	0	10	0	1923	644	8849
17	1761	529	758	141	613	101	54335	690	9336	5668	65	6285	0	5550	117	2008	1	653	0	32	0	2036	647	17232
18	1764	1150	1121	31	525	43	55181	705	5006	5022	1	6022	0	11904	107	1883	-1	217	0	31	0	1726	813	5142
19	1532	966	1121	19	465	157	57969	836	6856	5743	1	6230	1	5380	205	2434	0	467	33	40	0	907	719	6450
20	1077	1086	707	98	364	116	55794	548	5649	4921	4	6200	0	12138	104	1984	1	308	2	6	0	1186	896	8967
21	2103	1913	26064	29	487	154	48128	555	13211	5030	0	6008	1	3799	76	1785	0	1173	0	128	0	6403	1828	101268
22	1883	3372	47011	1	1152	122	40656	523	24060	4534	13	5218	0	238	139	1248	1	2197	3	169	0	25929	6339	241913

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation ...

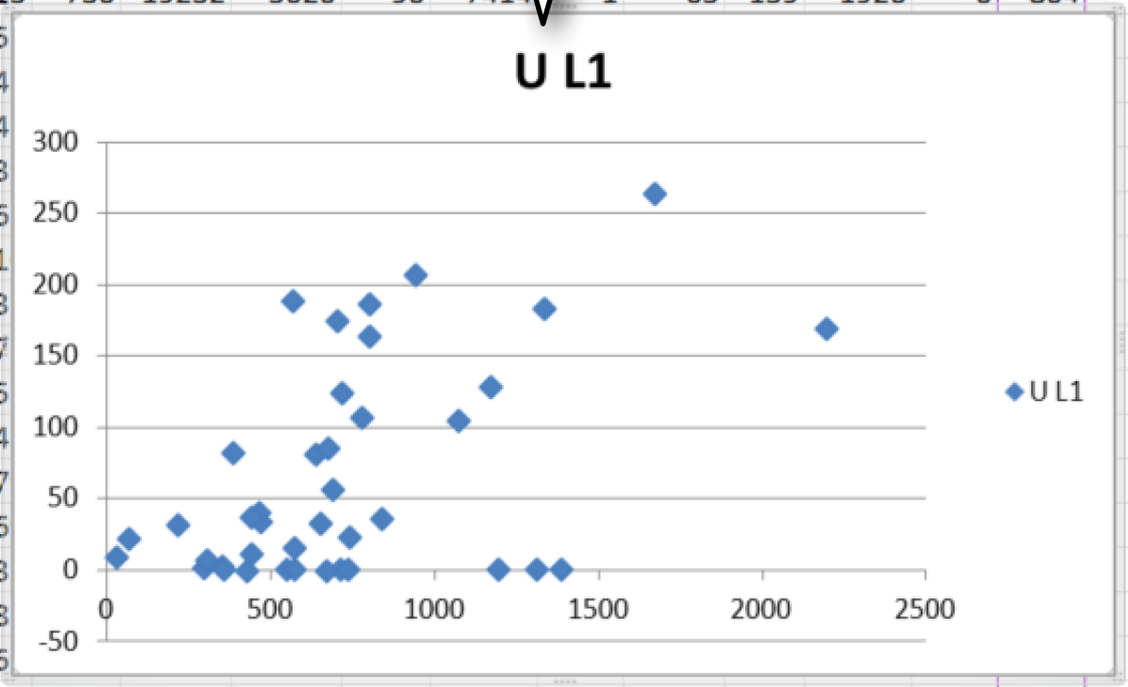
Chart Tools

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Design | Layout | Format

Change Chart Type | Save As Template | Type | Switch Row/Column | Select Data | Data | Chart Layouts | Move Chart | Location

Chart 5

	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AO
1	K K12	Mn K12	Nb K12	Ni K12	Pb L1	Pb M1	Pd K12	Pd L1	Rb K12	Rh K1													2
2	1485	1129	1628	101	503	126	54600	682	7365	5423													89
3	122	1841	361	515	96	107	41099	452	385	5122	90	476	13	16084	76	1675	1	29	-2	8	14	793	1167	4340
4	1894	534	31448	65	1521	115	53313	730	19232	5020	90	7414	1	65	139	1926	0	804	0	186	0	19059	3635	29868
5	1412	3006	1816	1	486	167	5025												30	1	0	5631	2122	34642
6	1577	939	4709	58	865	178	5274												7	33	51	6977	1839	63315
7	1820	847	10880	10	1053	37	4854												0	0	0	8998	2796	104283
8	1880	624	1080	20	739	194	5413												1	15	0	819	616	18235
9	1842	740	5904	39	586	176	5576												0	174	0	3735	1017	15608
10	1674	737	2100	10	1016	102	5381												0	-1	0	4509	992	29501
11	1571	588	1360	87	409	101	5523												0	2	0	4325	1136	12090
12	1885	683	993	1	546	125	5557												0	0	0	993	665	8234
13	1725	688	836	17	654	84	5495												32	80	0	2022	634	19522
14	1704	428	5537	1	717	167	5074												0	0	0	14820	3290	115478
15	1728	1519	2406	53	841	150	5597												0	188	0	378	954	11461
16	1583	638	774	22	386	109	5556												0	10	0	1923	644	8849
17	1761	529	758	141	613	101	5433												0	32	0	2036	647	17232
18	1764	1150	1121	31	525	43	5518												0	31	0	1726	813	5142
19	1532	966	1121	19	465	157	5796												33	40	0	907	719	6450
20	1077	1086	707	98	364	116	55794	548	5649	4921	4	6200	0	12138	104	1984	1	308	2	6	0	1186	896	8967
21	2103	1913	26064	29	487	154	48128	555	13211	5030	0	6008	1	3799	76	1785	0	1173	0	128	0	6403	1828	101268
22	1883	3372	47011	1	1152	122	40656	523	24060	4534	13	5218	0	238	139	1248	1	2197	3	169	0	25929	6339	241913



This will create a scatterplot with Thorium on the X-axis and Uranium on the Y-axis

Parameter | Points

Ready | Average: 394.925 | Count: 82 | Sum: 31594 | 100%

1:40 PM
1/10/2014

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation ...

Chart Tools

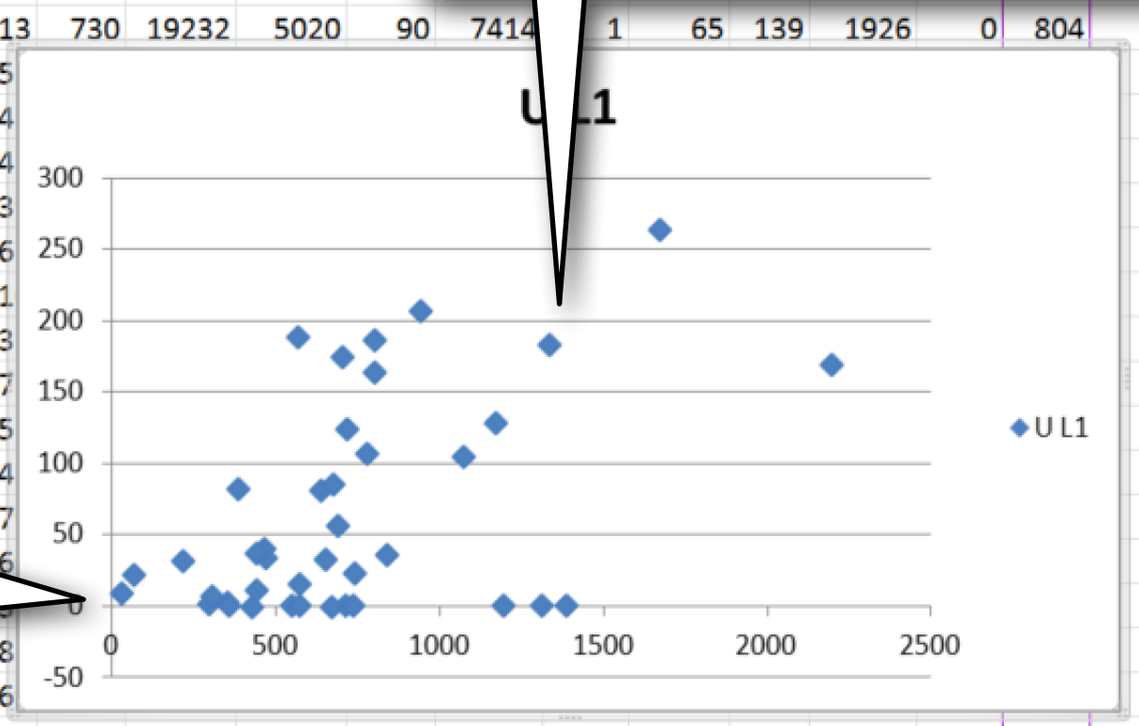
File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Design | Layout | Format

Change Chart Type | Save As Template | Type
Switch Row/Column | Select Data | Data
Chart Layouts
Chart Styles
Move Chart | Location

Chart 5

	Q	R	S	T	U	V	W	X	Y	Z	A
1	K K12	Mn K12	Nb K12	Ni K12	Pb L1	Pb M1	Pd K12	Pd L1	Rb K12	Rh K12	Rh
2	1485	1129	1628	101	503	126	54600	682	7365	5423	
3	122	1841	361	515	96	107	41099	452	385	5122	9
4	1894	534	31448	65	1521	115	53313	730	19232	5020	90
5	1412	3006	1816	1	486	167	5025				
6	1577	939	4709	58	865	178	5274				
18	1764	1150	1121	31	525	43	5518				
19	1532	966	1121	19	465	157	5796				
20	1077	1086	707	98	364	116	55794	548	5649	4921	4
21	2103	1913	26064	29	487	154	48128	555	13211	5030	0
22	1883	3372	47011	1	1152	122	40656	523	24060	4534	13

7414	1	65	139	1926	0	804	0	186	0	19059	3635	29868
							30	1	0	5631	2122	34642
							7	33	51	6977	1839	63315
							0	0	0	8998	2796	104283
							1	15	0	819	616	18235
							0	174	0	3735	1017	15608
							0	-1	0	4509	992	29501
							0	2	0	4325	1136	12090
							0	0	0	993	665	8234
							32	80	0	2022	634	19522
							0	0	0	14820	3290	115478
							0	188	0	378	954	11461
							0	10	0	1923	644	8849
							0	32	0	2036	647	17232
							0	31	0	1726	813	5142
							33	40	0	907	719	6450
6200	0	12138	104	1984	1	308	2	6	0	1186	896	8967
6008	1	3799	76	1785	0	1173	0	128	0	6403	1828	101268
5218	0	238	139	1248	1	2197	3	169	0	25929	6339	241913



You can see a clear trend here

But no trend is evident when Uranium can not be detected

Parameter | Points

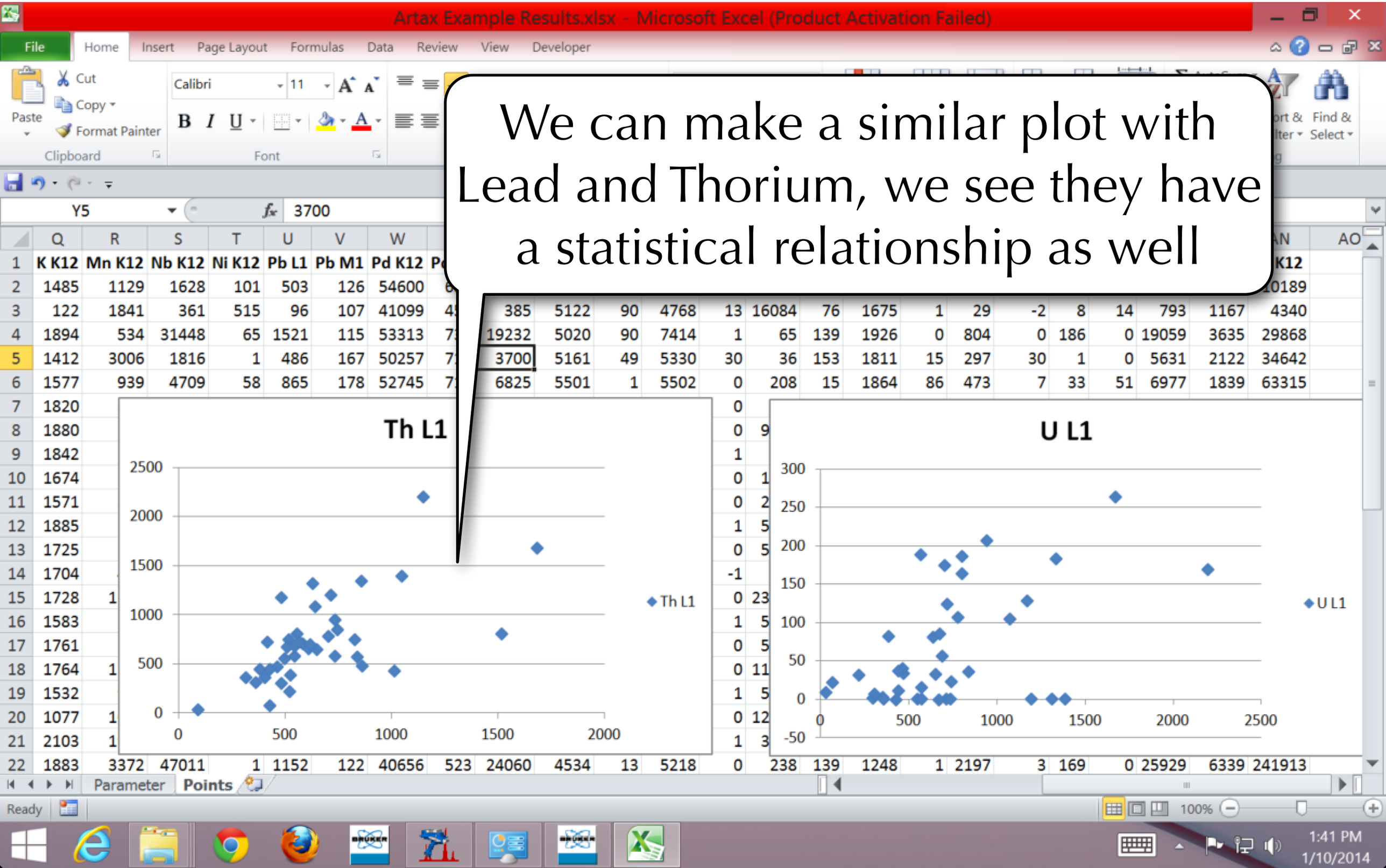
Ready

Average: 394.925 Count: 82 Sum: 31594

100%

1:40 PM
1/10/2014

Bayesian Deconvolution



We can make a similar plot with Lead and Thorium, we see they have a statistical relationship as well

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation ...

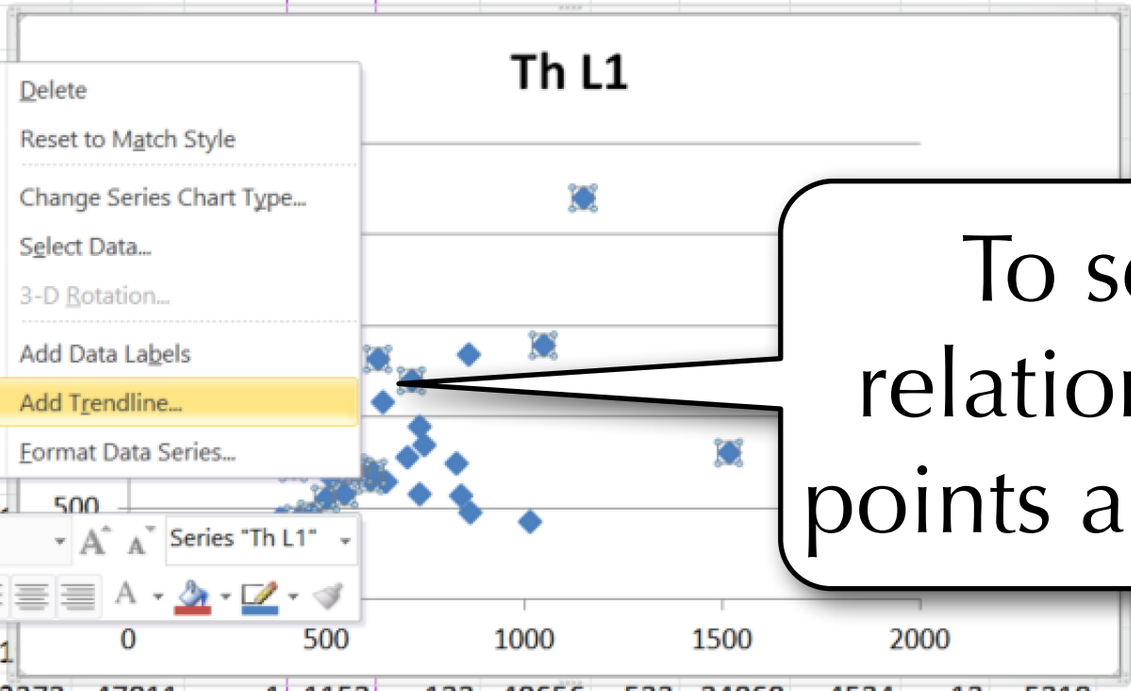
Chart Tools

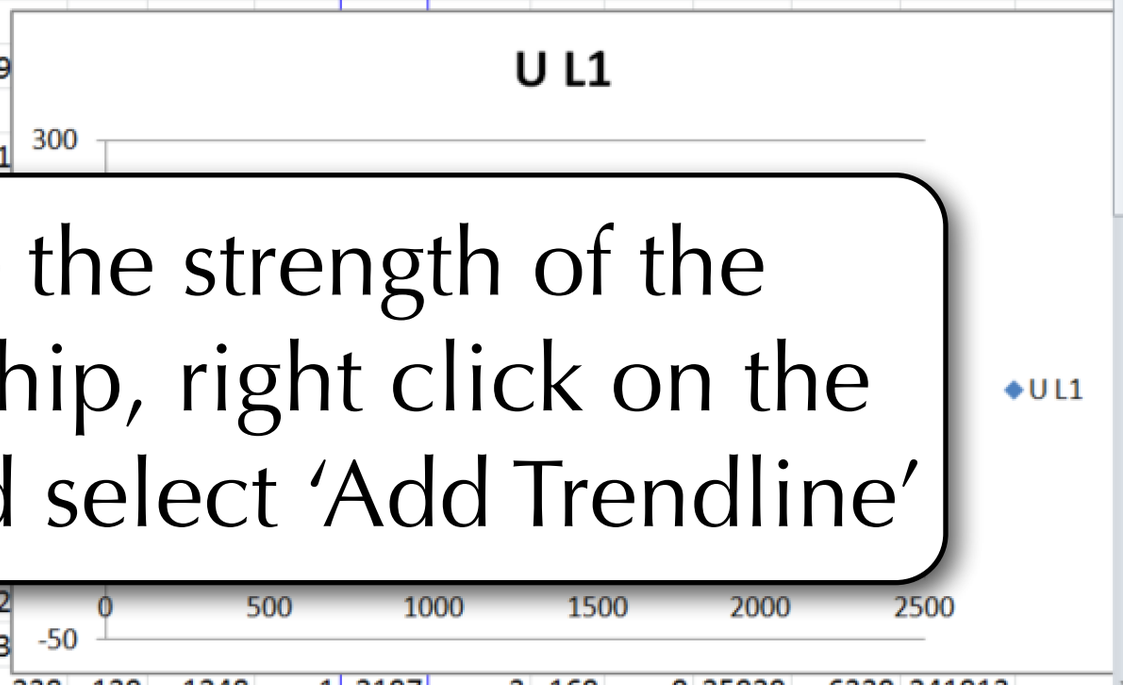
File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Design | Layout | Format

Change Chart Type | Save As Template — Type
Switch Row/Column | Select Data — Data
Chart Layouts
Chart Styles
Move Chart — Location

Chart 6 | =SERIES(Points!$AH$1,Points!$U$2:$U$41,Points!$AH$2:$AH$41,1)

	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO
1	K K12	Mn K12	Nb K12	Ni K12	Pb L1	Pb M1	Pd K12	Pd L1	Rb K12	Rh K12	Rh L1	Sn K12	Sn L1	Sr K12	Sr L1	Te K12	Te L1	Th L1	Th M1	U L1	U M1	Y K12	Zn K12	Zr K12	
2	1485	1129	1628	101	503	126	54600	682	7365	5423	0	6041	0	24721	119	2206	0	549	2	0	0	1169	851	10189	
3	122	1841	361	515	96	107	41099	452	385	5122	90	4768	13	16084	76	1675	1	29	-2	8	14	793	1167	4340	
4	1894	534	31448	65	1521	115	53313	730	19232	5020	90	7414	1	65	139	1926	0	804	0	186	0	19059	3635	29868	
5	1412	3006	1816	1	486	167	50257	711	3700	5161	49	5330	30	36	153	1811	15	297	30	1	0	5631	2122	34642	
6	1577	939	4709	58	865	178	52745	715	6825	5501	1	5502	0	208	15	1864	86	473	7	33	51	6977	1839	63315	
7	1820												0												
8	1880												0	9											
9	1842												1												
10	1674												0	1											
11	1571																								
12	1885																								
13	1725																								
14	1704																								
15	1728																								
16	1583																								
17	1761																								
18																									
19																									
20																									
21	2103	1											1	3											
22	1883	3372	47011	1	1152	122	40656	523	24060	4534	13	5218	0	238	139	1248	1	2197	3	169	0	25929	6339	241913	





To see the strength of the relationship, right click on the points and select ‘Add Trendline’

Parameter | Points

Ready

100%

1:42 PM
1/10/2014

Bayesian Deconvolution

Choose ‘Linear’ - though for your data other models may be appropriate

Make sure you show the equation and R^2 value

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation ...

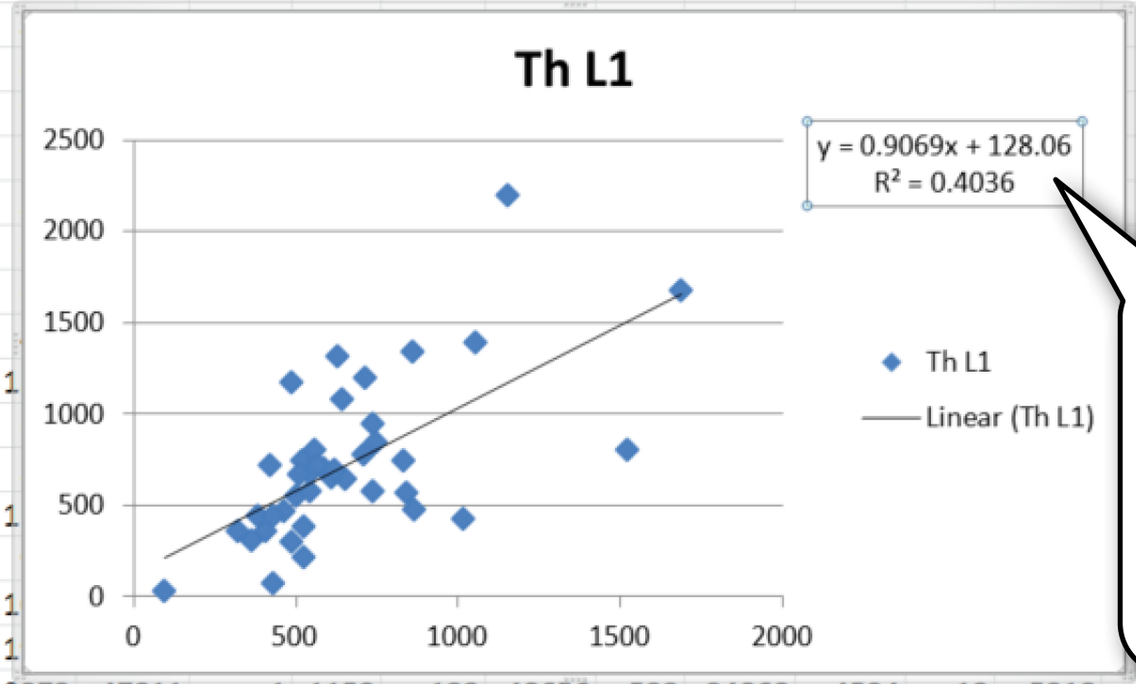
Chart Tools

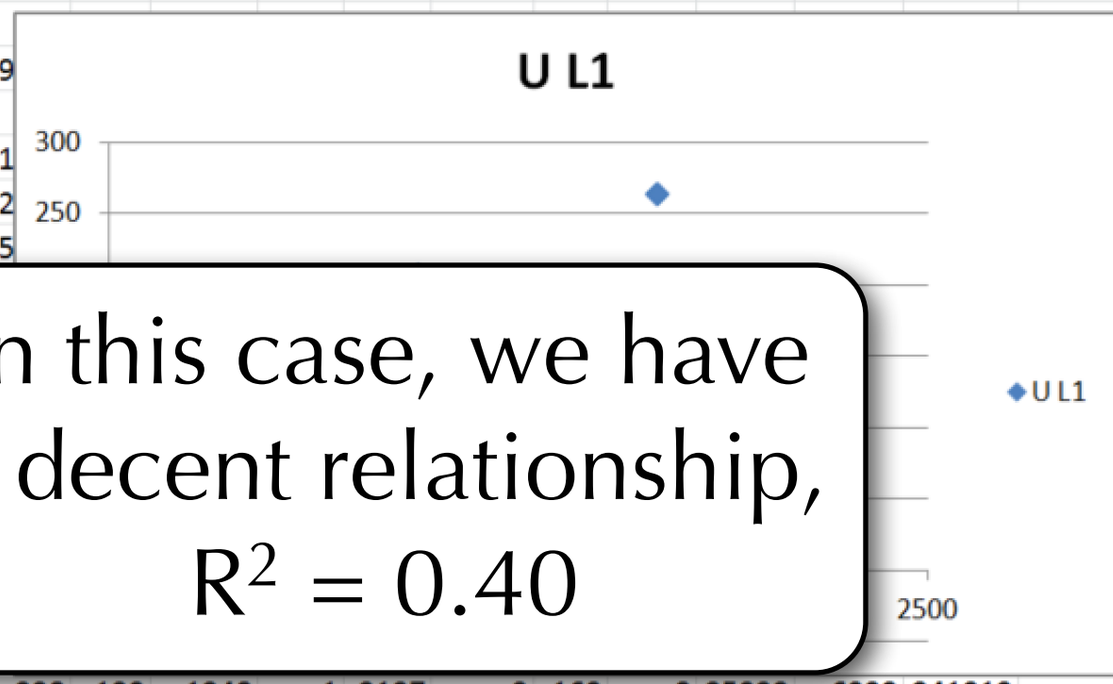
File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Design | Layout | Format

Change Chart Type | Save As Template | Type
Switch Row/Column | Select Data | Data
Chart Layouts
Chart Styles
Move Chart | Location

Chart 6

	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO
1	K K12	Mn K12	Nb K12	Ni K12	Pb L1	Pb M1	Pd K12	Pd L1	Rb K12	Rh K12	Rh L1	Sn K12	Sn L1	Sr K12	Sr L1	Te K12	Te L1	Th L1	Th M1	U L1	U M1	Y K12	Zn K12	Zr K12	
2	1485	1129	1628	101	503	126	54600	682	7365	5423	0	6041	0	24721	119	2206	0	549	2	0	0	1169	851	10189	
3	122	1841	361	515	96	107	41099	452	385	5122	90	4768	13	16084	76	1675	1	29	-2	8	14	793	1167	4340	
4	1894	534	31448	65	1521	115	53313	730	19232	5020	90	7414	1	65	139	1926	0	804	0	186	0	19059	3635	29868	
5	1412	3006	1816	1	486	167	50257	711	3700	5161	49	5330	30	36	153	1811	15	297	30	1	0	5631	2122	34642	
6	1577	939	4709	58	865	178	52745	715	6825	5501	1	5502	0	208	15	1864	86	473	7	33	51	6977	1839	63315	
7	1820												0												
8	1880												0	9											
9	1842												1												
10	1674												0	1											
11	1571												0	2											
12	1885												1	5											
13	1725																								
14	1704																								
15	1728	1																							
16	1583																								
17	1761																								
18	1764	1																							
19	1532																								
20	1077	1																							
21	2103	1																							
22	1883	3372	47011	1	1152	122	40656	523	24060	4534	13	5218	0	238	139	1248	1	2197	3	169	0	25929	6339	241913	





In this case, we have a decent relationship, $R^2 = 0.40$

Parameter | Points

Ready

100%

1:43 PM
1/10/2014

Bayesian Deconvolution

We can do the same with Uranium, and see that it has a weaker relationship, $R^2 = 0.255$

Artax Example Results.xlsx - Microsoft Excel (Product Activation ...

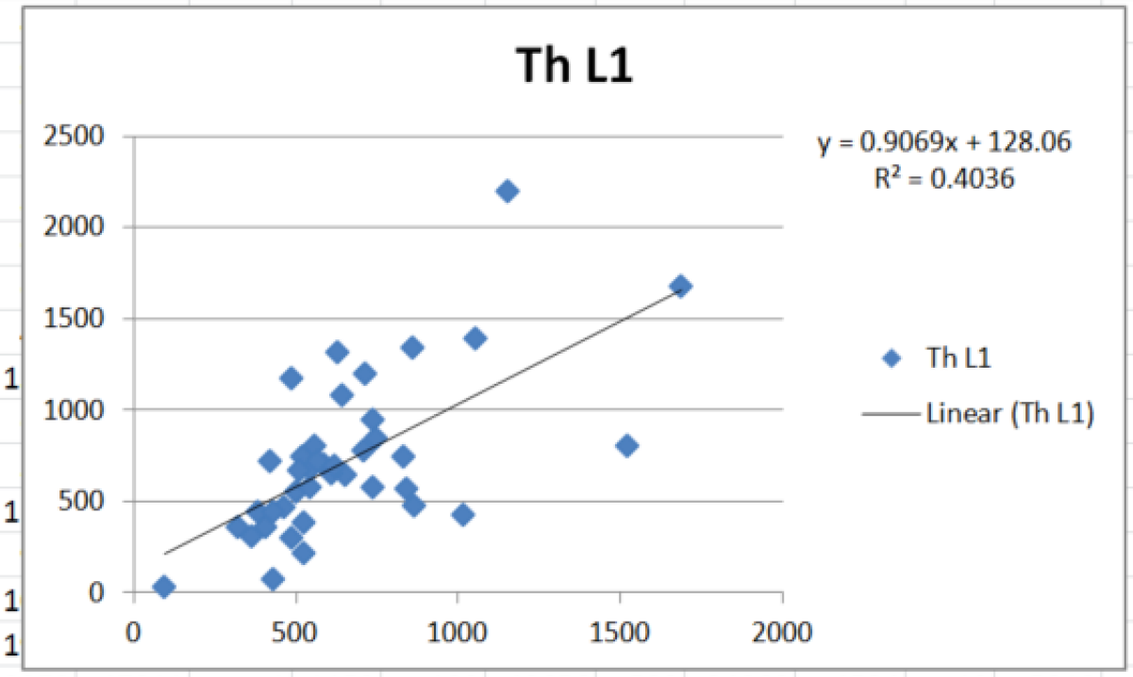
Chart Tools

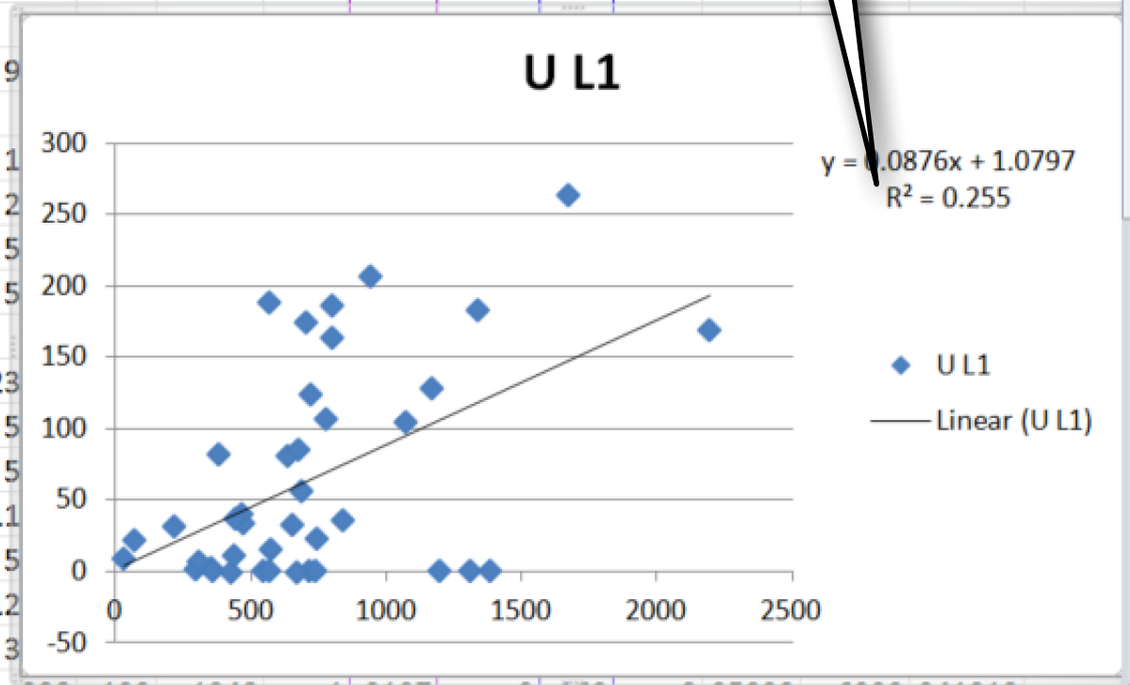
File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Design | Layout | Format

Change Chart Type | Save As Template | Type | Switch Row/Column | Select Data | Data | Chart Layouts | Move Chart | Location

Chart 5

	Q	R	S	T	U	V	W	X															AM	AN	AO
1	K K12	Mn K12	Nb K12	Ni K12	Pb L1	Pb M1	Pd K12	Pd L1															K12	Zr K12	
2	1485	1129	1628	101	503	126	54600	682	7365	5423	0	6041	0	24721	119	2206	0	549	2	0	0	116	851	10189	
3	122	1841	361	515	96	107	41099	452	385	5122	90	4768	13	16084	76	1675	1	29	-2	8	14	793	1167	4340	
4	1894	534	31448	65	1521	115	53313	730	19232	5020	90	7414	1	65	139	1926	0	804	0	186	0	19059	3635	29868	
5	1412	3006	1816	1	486	167	50257	711	3700	5161	49	5330	30	36	153	1811	15	297	30	1	0	5631	122	34642	
6	1577	939	4709	58	865	178	52745	715	6825	5501	1	5502	0	208	15	1864	86	473	7	33	51	6977	839	63315	
7	1820												0												
8	1880												0	9											
9	1842												1												
10	1674												0	1											
11	1571												0	2											
12	1885												1	5											
13	1725												0	5											
14	1704												-1												
15	1728	1											0	23											
16	1583												1	5											
17	1761												0	5											
18	1764	1											0	11											
19	1532												1	5											
20	1077	1											0	12											
21	2103	1											1	3											
22	1883	3372	47011	1	1152	122	40656	523	24060	4534	13	5218	0	238	139	1248	1	2197	3	169	0	25929	6339	241913	





Parameter | Points

Ready

100%

1:44 PM
1/10/2014

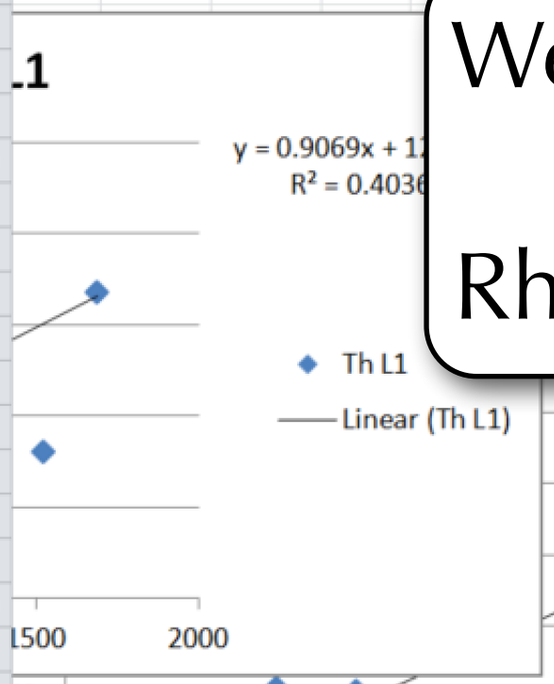
Bayesian Deconvolution

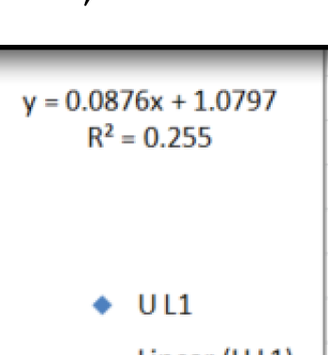
Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins

AP3

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
1	Pd L1	Rb K12	Rh K12	Rh L1	Sn K12	Sn L1	Sr K12	Sr L1	Te K12	Te L1	Th L1	Th M1	U L1	U M1	Y K12	Zn K12	Zr K12	Pb/Rh	Th/Rh	U/Rh			
2	682	7365	5423	0	6041	0	24721	119	2206	0	549	2	0	0	1169	851	10189						
3	452	385	5122	90	4768	13	16084	76	1675	1	29	-2	8	14	793	1167	4340						
4	730	19232	5020	90	7414	1	65	139	1926	0	804	0	186	0	19059	3635	29[illegible]						
5	711	3700	5161	49	5330	30	36	153	1811	15	297	30	1	0	5631	2122	[illegible]42						
6	715	6825	5501	1													63315						
7																	104283						
8																	18235						
9																	15608						
10																	29501						
11																	12090						
12																	8234						
13																	19522						
14																	115478						
15													0	188	0	378	954	11461					
16													0	10	0	1923	644	8849					
17													0	32	0	2036	647	17232					
18													0	31	0	1726	813	5142					
19													33	40	0	907	719	6450					
20													2	6	0	1186	896	8967					
21													0	128	0	6403	1828	101268					
22													3	169	0	25929	6339	241913					





We can also treat the data by normalizing to Rhodium, our X-ray target

Parameter | Points

Ready

100%

1:44 PM
1/10/2014

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

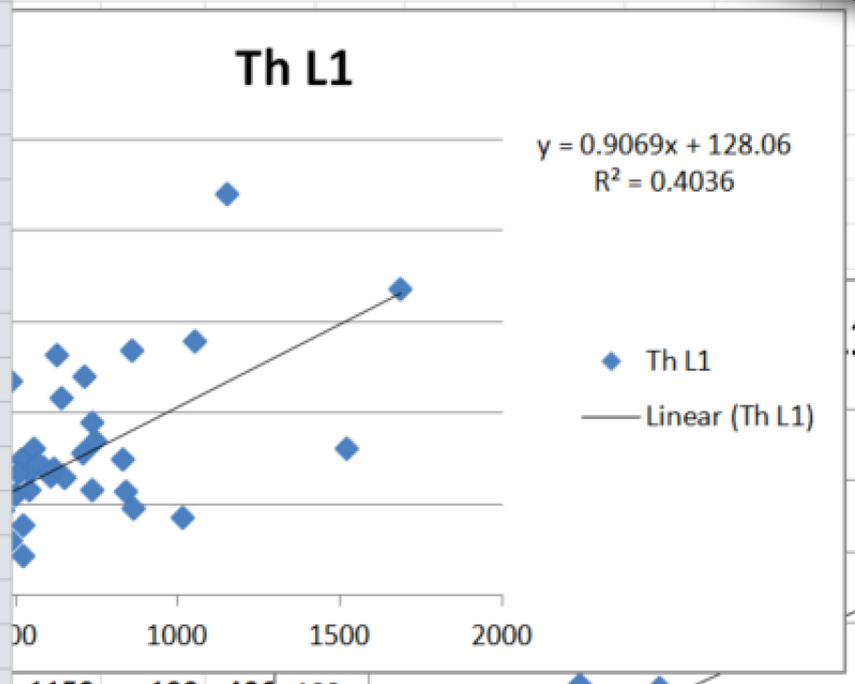
File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins

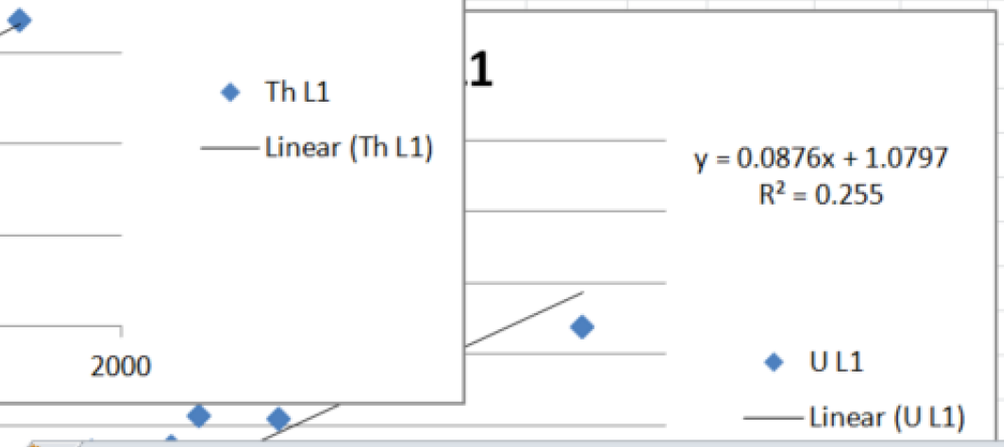
Cut | Copy | Format Painter | Paste | Clipboard | Font | Alignment | Number | Styles | Cells | Editing

Wrap Text | Merge & Center | General | Conditional Formatting | Format as Table | Cell Styles | Insert | Delete | Format | AutoSum | Fill | Clear | Sort & Filter | Find & Select

SUM | =U2/Z2

	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR
1	Pb L1	Pb M1	Pd K12	Pd L1	Rb K12	Rh K12	Rh L1	Sn K12	Sn L1	Sr K12	Sr L1	Te K12	Te L1	Th L1	Th M1	U L1	U M1	Y K12	Zn K12	Zr K12	Pb/Rh	Th/Rh	U/Rh	
2	503	126	54600	682	7365	5423	0	6041	0	24721	119	2206	0	549	2	0	0	1169	851	10189	=U2/Z2			
3	96	107	41099	452	385	5122	96	4768	13	16084	76	1675	1	29	-2	8	14	793	1167	4340				
4	1521	115	53313	752	19232	5020	90	7414	1	65	139	1926	0	804	0	186	0	19059	3635	29868				
5	486	167	50257	711	3700	5122	49	5330	30	153	1811	15	297	30	1	0	5631	2122	34642					
6	865	178	52745	715	6825	5501	1	5504	0	208	1564	86	473	7	33	51	6977	1839	63315					
7									0				1287	0	0	0	8998	2796	104283					
8									0	9227	119	2269			15	0	819	616	18235					
9									1	289	175	1999	1	704										
10									0	1845	135	1676	0	427	0									
11									0	2886	224	2496	-1	354	0									
12									1	5233	0	2565	-1	572	0									
13															32	8								
14															0									
15															0	18								
16															0	1								
17															0	3								
18															0	3								
19															33	4								
20															2	6	0	1186	896	8967				
21															0	128	0	6403	1828	101268				
22	1152	122	406	100											3	169	0	25929	6339	241913				





Divide the Net Counts for an element by the Net Counts for Rhodium

Parameter | Points

Point | 100%

1:45 PM
1/10/2014

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

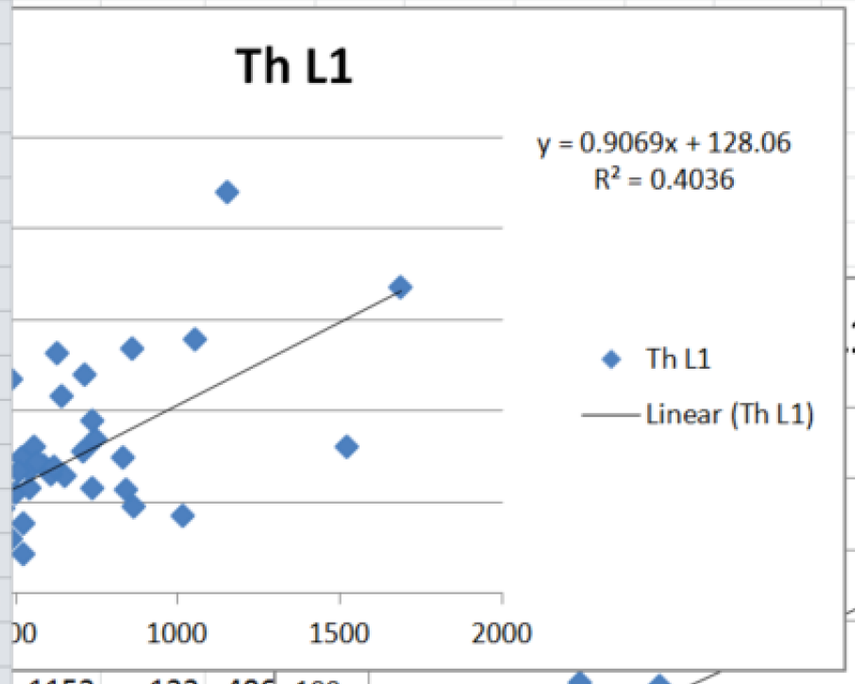
File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins

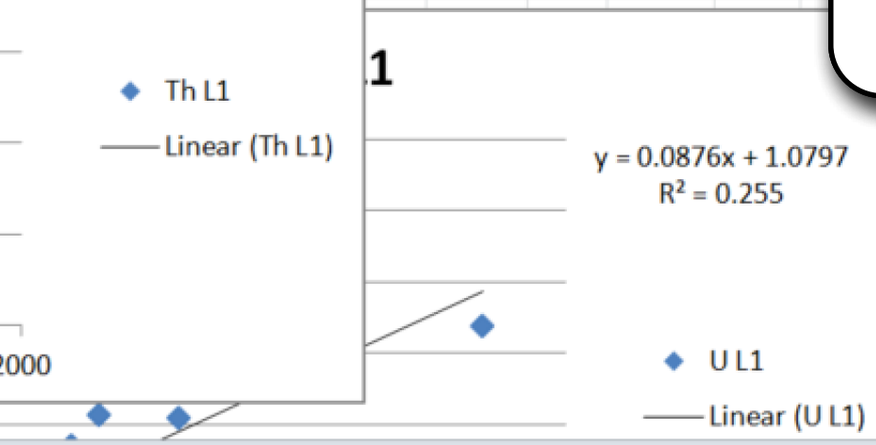
Cut | Copy | Format Painter | Paste | Clipboard | Font | Alignment | Number | Styles | Cells | Editing

Wrap Text | Merge & Center | General | Conditional Formatting | Format as Table | Cell Styles | Insert | Delete | Format | AutoSum | Fill | Clear | Sort & Filter | Find & Select

SUM | =AJ2/Z2

	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ
1	Pb L1	Pb M1	Pd K12	Pd L1	Rb K12	Rh K12	Rh L1	Sn K12	Sn L1	Sr K12	Sr L1	Te K12	Te L1	Th L1	Th M1	U L1	U M1	Y K12	Zn K12	Zr K12	Pb/Rh	Th/Rh	U/Rh
2	503	126	54600	682	7365	5423	0	6041	0	24721	119	2206	0	549	2	0	0	1169	851	10189	0.092753	0.101235	=AJ2/Z2
3	96	107	41099	452	385	5122	90	4768	13	16084	76	1675	1	29	-2	8	14	793	1167	4340			
4	1521	115	53313	730	19232	5020	90	7414		65	139	1926	0	804	0	1	0	19059	3635	29868			
5	486	167	50257	711	3700	5161	49	5330	30	36			15	297	30		0	5631	2122	34642			
6	865	178	52745	715	6825	5501	1	5502	0	208	15	180											
7									0	1	0	2014	1										
8									0	9227	119	2209	15										
9									1	289	175	1999	1										
10									0	1845	135	1676	0										
11									0	2886	224	2496	-1										
12									1	5233	0	2565	-1										
13																							
14																							
15																							
16																							
17																							
18																							
19																							
20																							
21																							
22	1152	122	406	100																			





0	188	0	378	954	11461	
0	10	0	1923	644	8849	
0	32	0	2036	647	17232	
0	31	0	1726	813	5142	
33	40	0	907	719	6450	
2	6	0	1186	896	8967	
0	128	0	6403	1828	101268	
3	169	0	25929	6339	241913	

Do the same for all elements you wish to normalize

Parameter | Points

Point | 100%

1:46 PM
1/10/2014

Bayesian Deconvolution

Artax Example Results.xlsx - Microsoft Excel (Product Activation Failed)

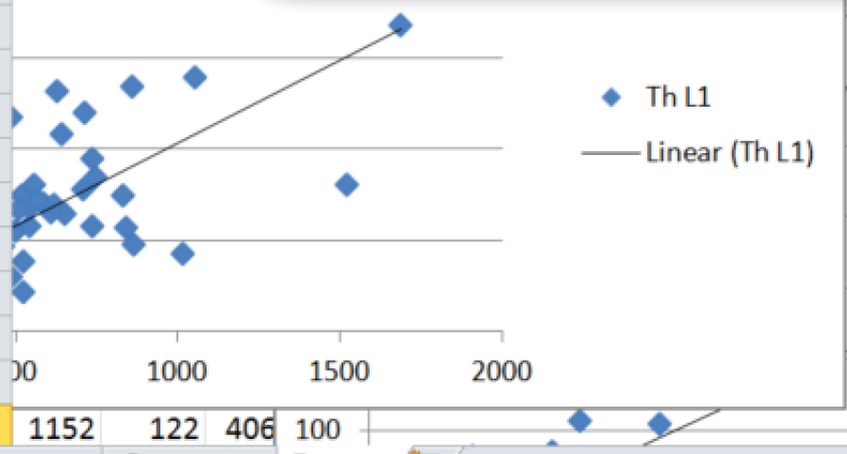
File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Add-Ins

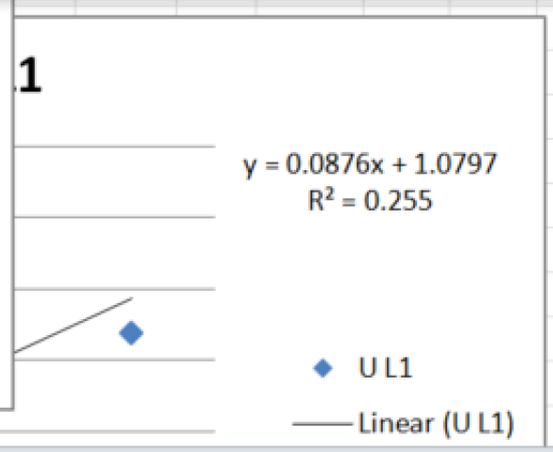
Cut | Copy | Format Painter | Paste | Clipboard
Calibri | 11 | Font
Wrap Text | Merge & Center | Alignment
General | Number
Conditional Formatting | Format as Table | Cell Styles | Styles
Insert | Delete | Format | Cells
AutoSum | Fill | Clear | Sort & Filter | Find & Select | Editing

AR22

	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR
1	Pb L1	Pb M1	Pd K12	Pd L1	Rb K12	Rh K12	Rh L1	Sn K12	Sn L1	Sr K12	Sr L1	Te K12	Te L1	Th L1	Th M1	U L1	U M1	Y K12	Zn K12	Zr K12	Pb/Rh	Th/Rh	U/Rh	
2	503	126	54600	682	7365	5423	0	6041	0	24721	119	2206	0	549	2	0	0	1169	851	10189	0.092753	0.101235	0	
3	96	107	41													8	14	793	1167	4340	0.018743	0.005662	0.001562	
4	1521	115	5													186	0	19059	3635	29868	0.302988	0.160159	0.037052	
5	486	167	5													1	0	5631	2122	34642	0.094168	0.057547	0.000194	
6	865	178	5													33	51	6977	1839	63315	0.157244	0.085984	0.005999	
7																0	0	8998	2796	104283	0.215734	0.284163	0	
8																				18235	0.138234	0.107744	0.002806	
9																174	0	3735	1017	15608	0.111006	0.133359	0.032961	
10																-1	0	4509	992	29501	0.191626	0.080536	-0.00019	
11																2	0	4325	1136	12090	0.080464	0.069644	0.000393	
12										1	5233	0	2565	-1	572	0	0	0	993	665	8234	0.116891	0.122458	0	
13																32	80	0	2022	634	19522	0.114156	0.111712	0.013964
14																0	0	0	14820	3290	115478	0.13847	0.23117	0
15																0	188	0	378	954	11461	0.14914	0.10055	0.033339
16																0	10	0	1923	644	8849	0.067259	0.077017	0.001742
17																0	32	0	2036	647	17232	0.108151	0.115208	0.005646
18																0	31	0	1726	813	5142	0.10454	0.04321	0.006173
19																33	40	0	907	719	6450	0.080968	0.081316	0.006965
20																2	6	0	1186	896	8967	0.073969	0.062589	0.001219
21																0	128	0	6403	1828	101268	0.096819	0.233201	0.025447
22	1152	122	406	100												3	169	0	25929	6339	241913	0.25408	0.484561	0.037274

You can copy and paste the cells to quickly run calculations for all your data





Parameter | Points

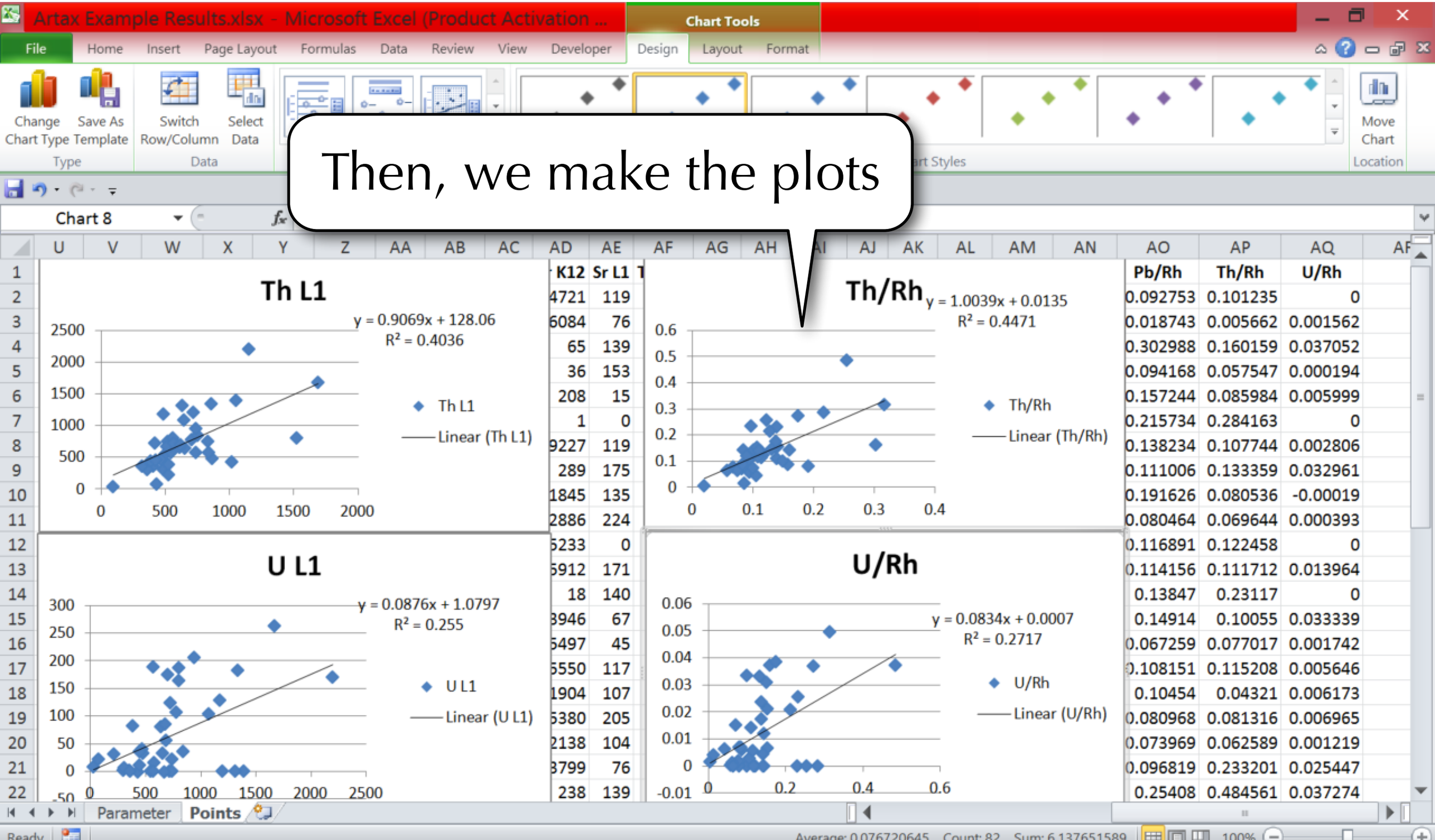
Ready

100%

1:47 PM
1/10/2014

Bayesian Deconvolution

Then, we make the plots



Bayesian Deconvolution

You can see R2 values are better for normalized data

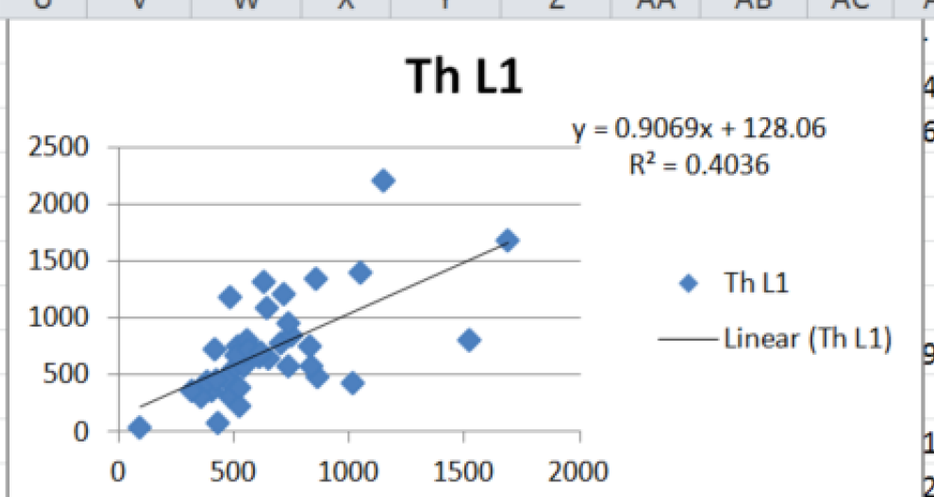
Artax Example Results.xlsx - Microsoft Excel (Product Activation ...

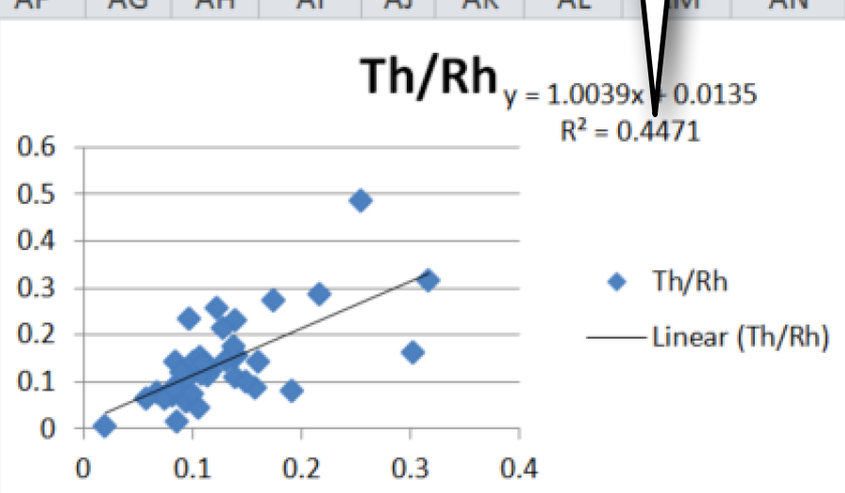
Chart Tools

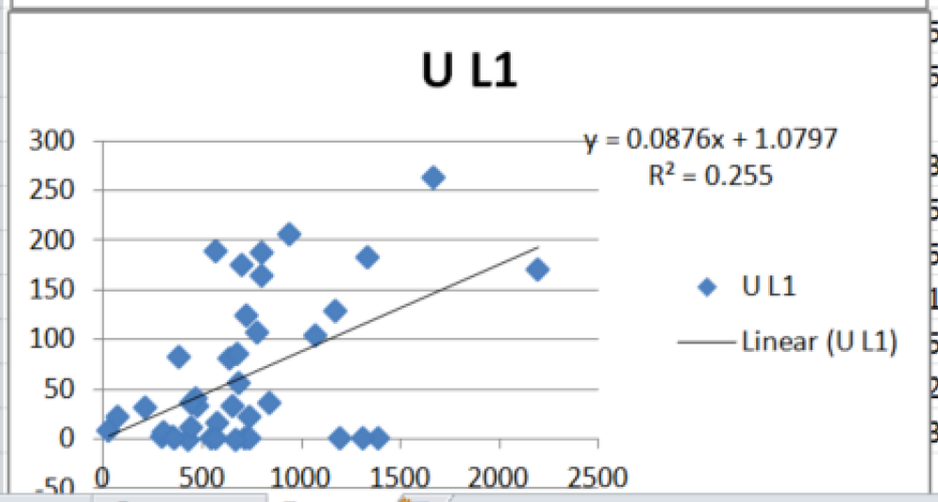
File | Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Design | Layout | Format

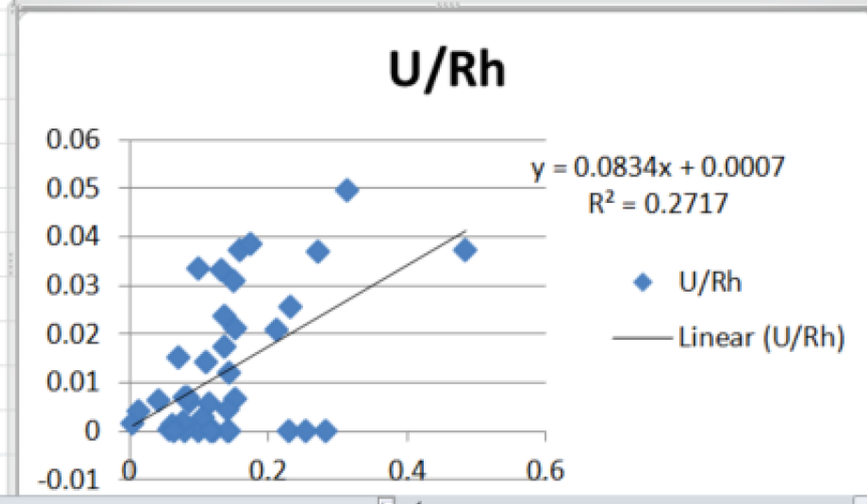
Move Chart Location

Chart 8









	K12	Sr L1	Pb/Rh	Th/Rh	U/Rh
2	4721	119	0.092753	0.101235	0
3	6084	76	0.018743	0.005662	0.001562
4	65	139	0.302988	0.160159	0.037052
5	36	153	0.094168	0.057547	0.000194
6	208	15	0.157244	0.085984	0.005999
7	1	0	0.215734	0.284163	0
8	9227	119	0.138234	0.107744	0.002806
9	289	175	0.111006	0.133359	0.032961
10	1845	135	0.191626	0.080536	-0.00019
11	2886	224	0.080464	0.069644	0.000393
12	5233	0	0.116891	0.122458	0
13	5912	171	0.114156	0.111712	0.013964
14	18	140	0.13847	0.23117	0
15	3946	67	0.14914	0.10055	0.033339
16	5497	45	0.067259	0.077017	0.001742
17	5550	117	0.108151	0.115208	0.005646
18	1904	107	0.10454	0.04321	0.006173
19	5380	205	0.080968	0.081316	0.006965
20	2138	104	0.073969	0.062589	0.001219
21	3799	76	0.096819	0.233201	0.025447
22	238	139	0.25408	0.484561	0.037274

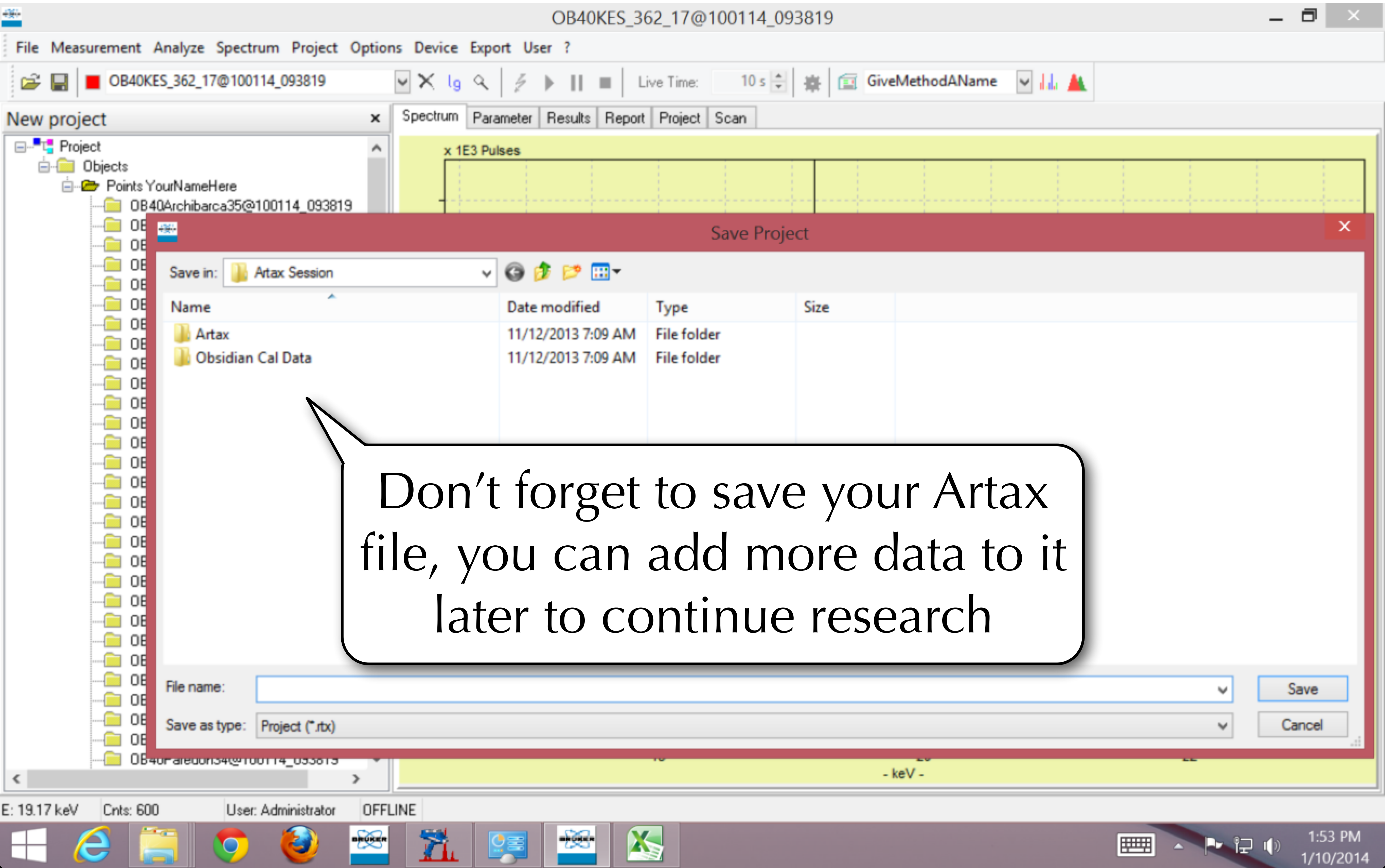
Parameter | Points

Ready

Average: 0.076720645 Count: 82 Sum: 6.137651589 100%

1:49 PM
1/10/2014

Bayesian Deconvolution



Don't forget to save your Artax file, you can add more data to it later to continue research