

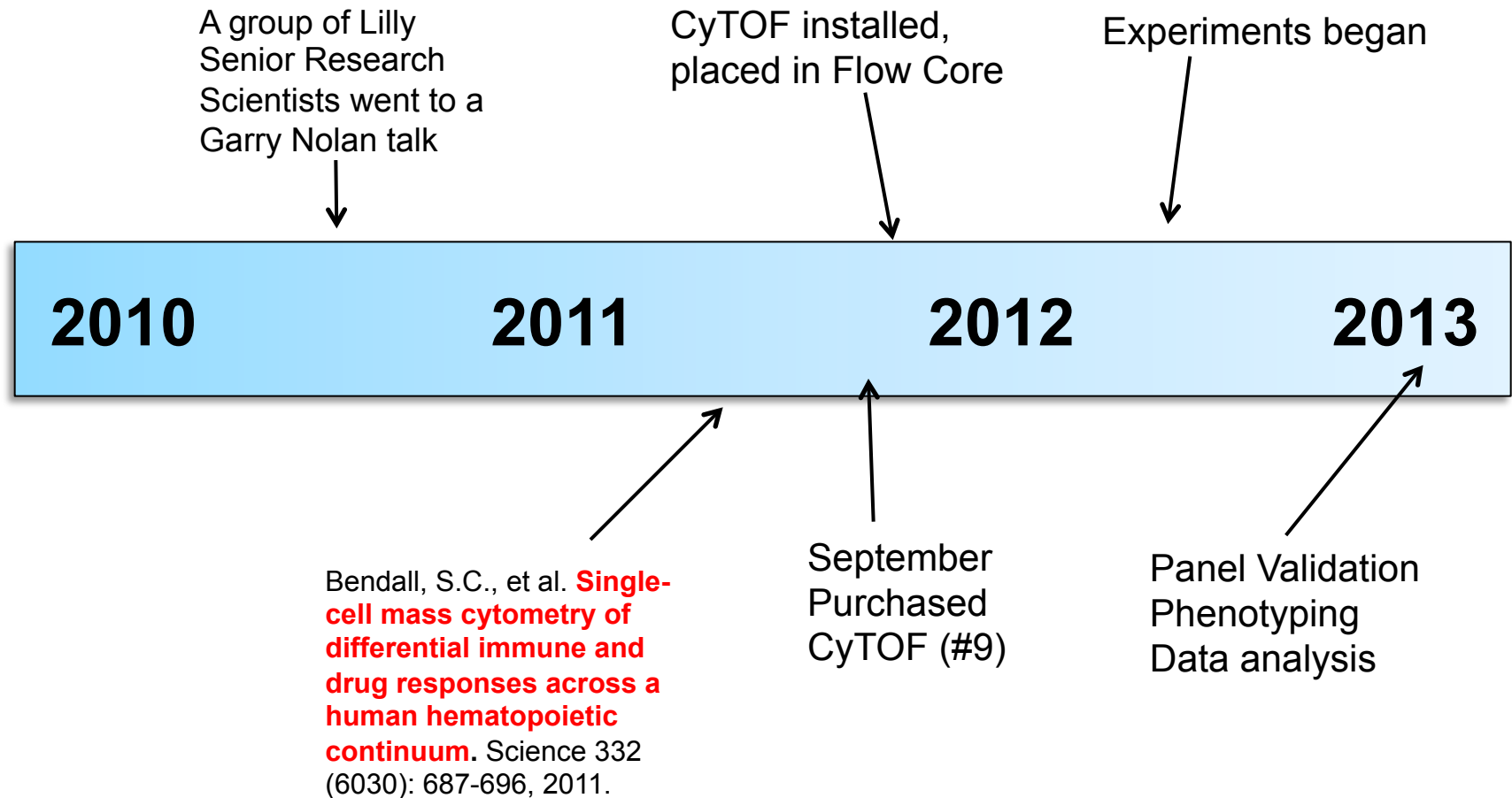
How to Get the Best Performance out of your CyTOF

Carina Torres
CyTOF User Group Meeting
CYTO 2013
23 May 2013

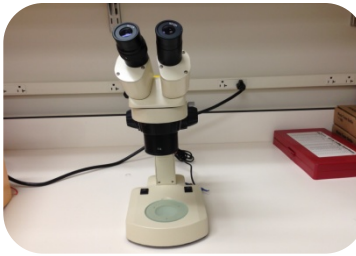
Outline

- **History**
- **CyTOF Workflow**
 - **Instrument Startup**
 - **Optimization**
 - **Running Samples**
 - **Instrument Shutdown**
 - **Troubleshooting**
- **Progress Report...1 ½ years later**

CyTOF at Lilly



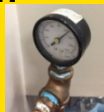
Preparing your Lab



Daily Workflow: Instrument Startup

Make sure Argon is on

- 100 psi at wall
- 50 psi on instrument



Check lights on instrument

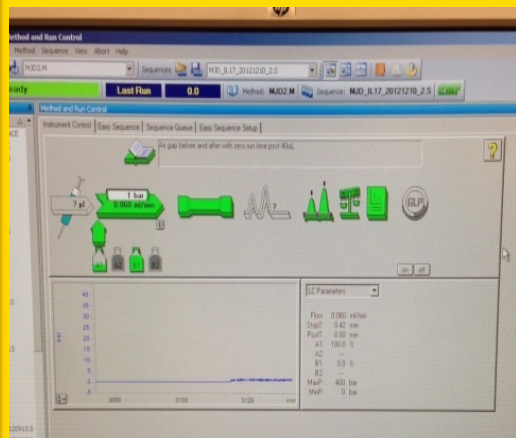


Turn Heater on

Instrument setup → Card Cage Tab
→ Click Heater on → 200°C



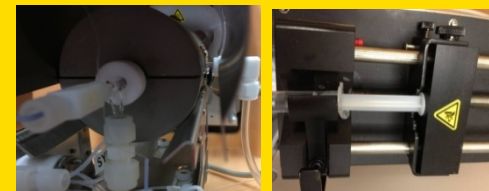
Start Syringe pump (HPLC)



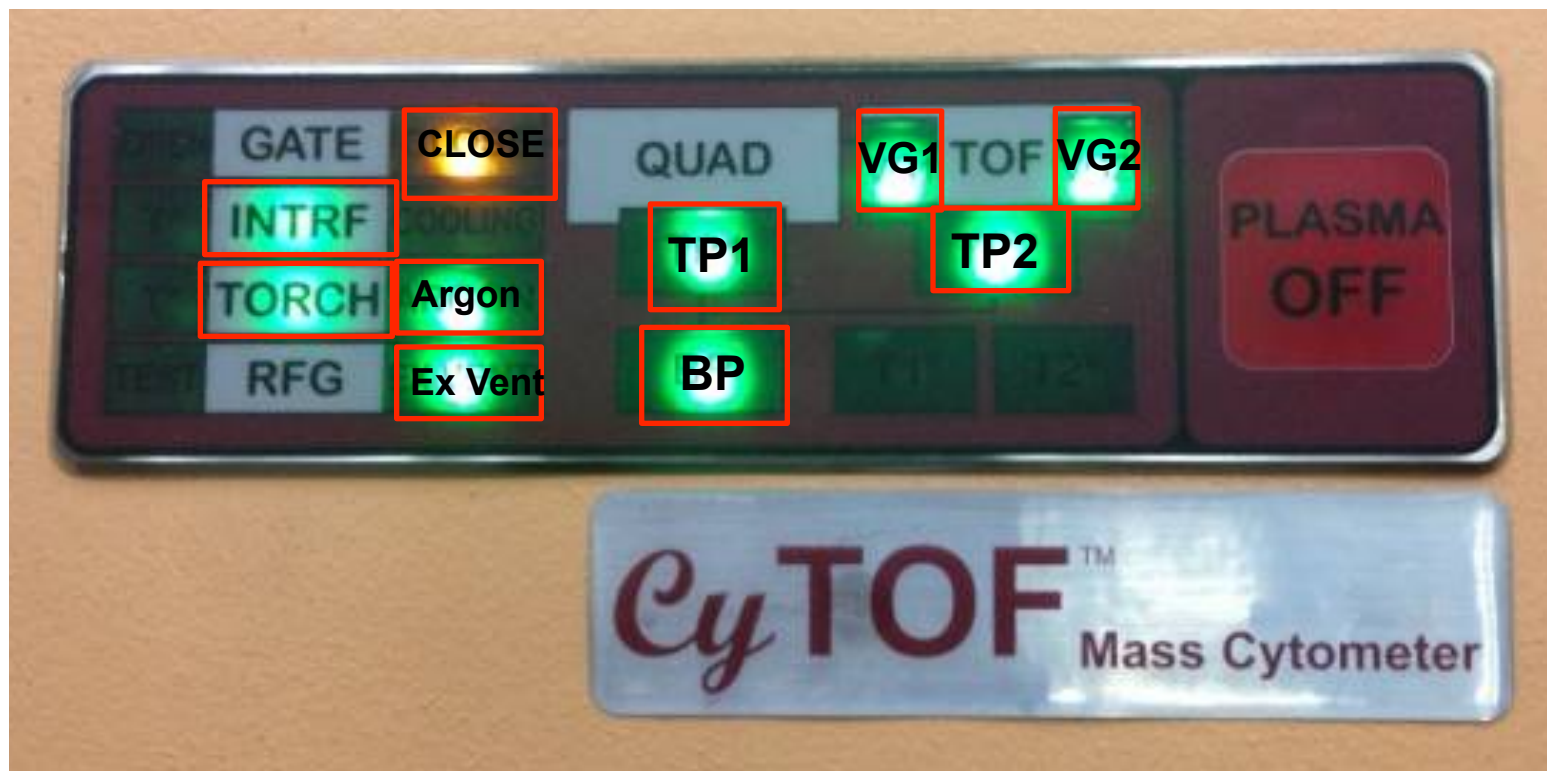
Start Plasma



Prepare Nebulizer and Syringe Pump



Instrument Startup



Instrument Startup

Make sure Argon is on

- 100 psi at wall
- 50 psi on instrument



Check lights on instrument

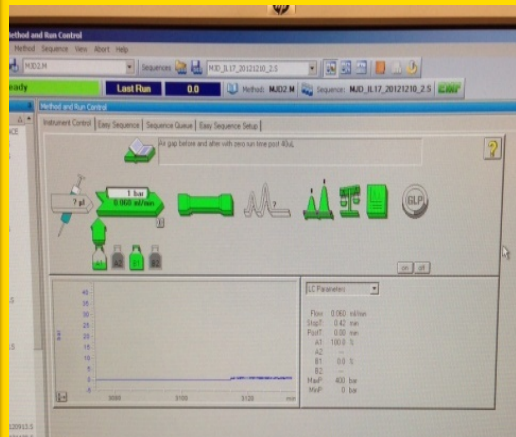


Turn Heater on

Instrument setup → Card Cage Tab
→ Click Heater on → 200°C



Start Syringe pump (HPLC)



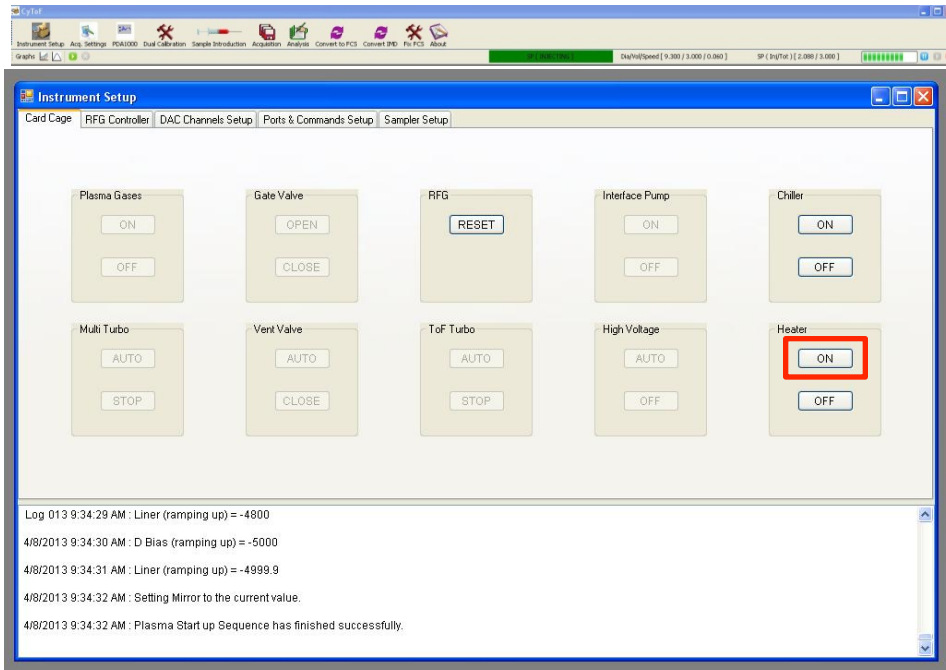
Start Plasma



Prepare Nebulizer and Syringe Pump



Instrument Startup



20 min
→



Instrument Startup

Make sure Argon is on

- 100 psi at wall
- 50 psi on instrument



Check lights on instrument

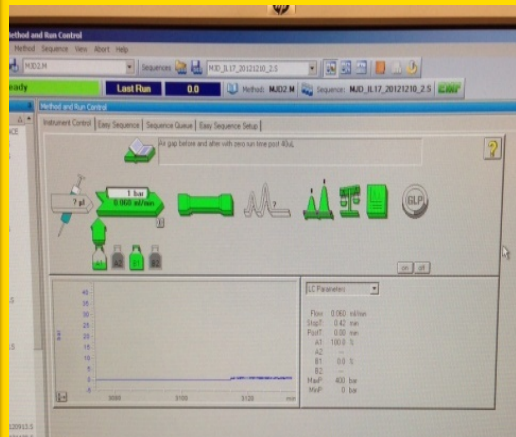


Turn Heater on

Instrument setup → Card Cage Tab
→ Click Heater on → 200°C



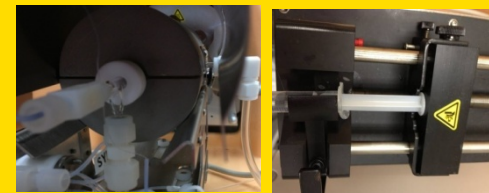
Start Syringe pump (HPLC)



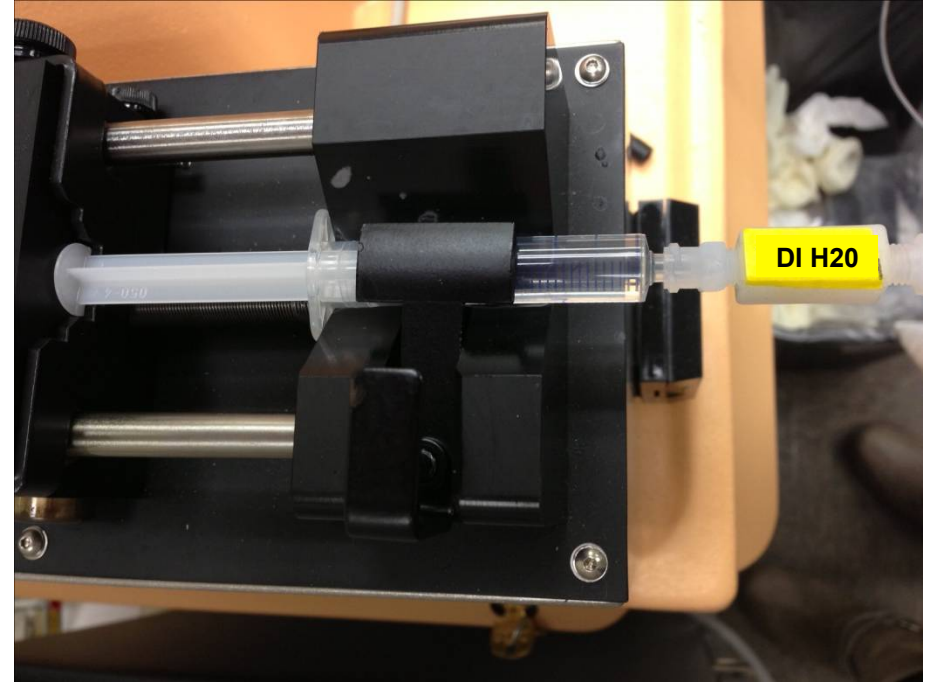
Start Plasma



Prepare Nebulizer and Syringe Pump



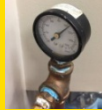
Instrument Startup



Instrument Startup

Make sure Argon is on

- 100 psi at wall
- 50 psi on instrument



Check lights on instrument

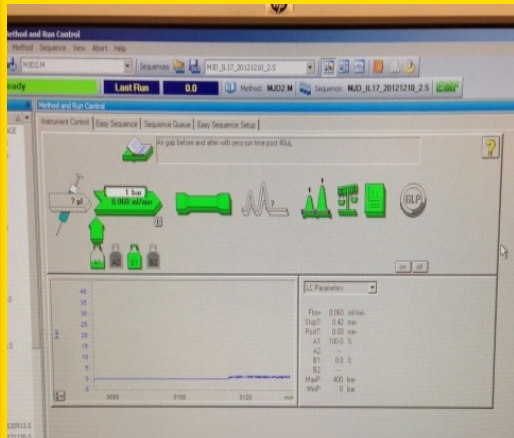


Turn Heater on

Instrument setup → Card Cage Tab
→ Click Heater on → 200°C



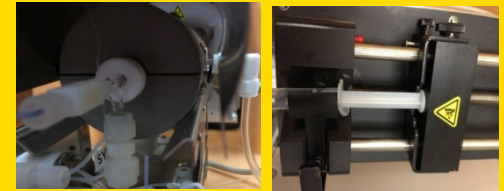
Start Syringe pump (HPLC)



Start Plasma



Prepare Nebulizer and Syringe Pump



Instrument Startup

The screenshot displays the 'Instrument Setup' window for a CyToF system. The 'Plasma Management' section is active, showing the RFG Status as 'WARM UP MODE [2013/04/07 10:23:43]'. Below this, the 'RFG Warm up delay' is represented by a green progress bar. The 'Start Plasma' button is highlighted with a red box. To the right, several parameters are displayed: Plate current, A (0.000), Plate voltage, V (0), Factual Power Level, W (0.000), and Power (1300) with a 'Set' button. The log at the bottom shows the following entries:

- Log 013 10:22:12 AM : Nebulizer Gas On (0.45L/minute).
- 4/7/2013 10:22:12 AM : Makeup Gas to 1 L/minute.
- 4/7/2013 10:22:12 AM : Waiting for 10 seconds.
- 4/7/2013 10:22:22 AM : RFG PREPARE.
- 4/7/2013 10:22:22 AM : Waiting for RFG to warm up (timeout is 100 seconds).

- Chiller turns on
- Start-up sequence
- Plasma ignites

Instrument Startup

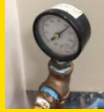
The screenshot displays the 'Instrument Setup' window of the CyToF software. The 'RFG Controller' tab is active, showing the 'Plasma Management' section. A green progress bar indicates the RFG Status as 'PLASMA MODE [2013/04/07 10:25:15]'. On the right, there are input fields for 'Plate current, A' (0.555), 'Plate voltage, V' (3315), and 'Factual Power Level, W' (1325.428). Below these is a 'Power' field set to 1300 with a 'Set' button. At the bottom of the main panel are 'Start Plasma' and 'Stop Plasma' buttons. A modal dialog box is open in the center, displaying the message: 'Plasma Start Up Sequence has been completed successfully.' with an 'OK' button. At the bottom of the window, a log window shows the following entries:

- Log 013 10:25:03 AM : Liner (ramping up) = -4800
- 4/7/2013 10:25:04 AM : D Bias (ramping up) = -5000
- 4/7/2013 10:25:05 AM : Liner (ramping up) = -4999.9
- 4/7/2013 10:25:06 AM : Setting Mirror to the current value.
- 4/7/2013 10:25:06 AM : Plasma Start up Sequence has finished successfully.

Instrument Startup

Make sure Argon is on

- 100 psi at wall
- 50 psi on instrument



Check lights on instrument

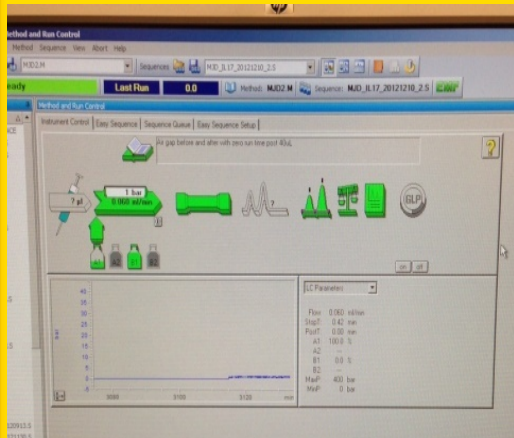


Turn Heater on

Instrument setup → Card Cage Tab
→ Click Heater on → 200°C



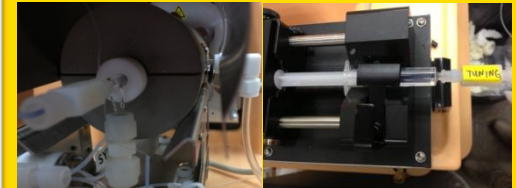
Start Syringe pump (HPLC)



Start Plasma



Prepare Nebulizer and Syringe Pump



Instrument Startup

The screenshot displays the CyToF software interface. The main window title is "CyToF" and the menu bar includes: Instrument Setup, Acq. Settings, PDA1000, Dual Calibration, Sample Introduction, Acquisition, Analysis, Convert to FCS, Convert IMD, Fix FCS, and About. The status bar at the top shows "SP [IDLE]", "Dia(Vol/Speed [9.300 / 3.000 / 0.060])", and "SP (Inj/Tot) [0.000 / 0.000]". A red box highlights a play button icon in the top right corner of the main window.

The "Instrument Setup" dialog box is open, showing the "RFG Controller" tab. The "Plasma Management" section contains:

- RFG Status:** WARM UP MODE (2013/04/07 10:23:43)
- RFG Warm up delay:** A progress bar with 10 green segments, indicating the warm-up progress.
- Plate current, A:** 0.000
- Plate voltage, V:** 0
- Factual Power Level, W:** 0.000
- Power:** 1300 (with a "Set" button)

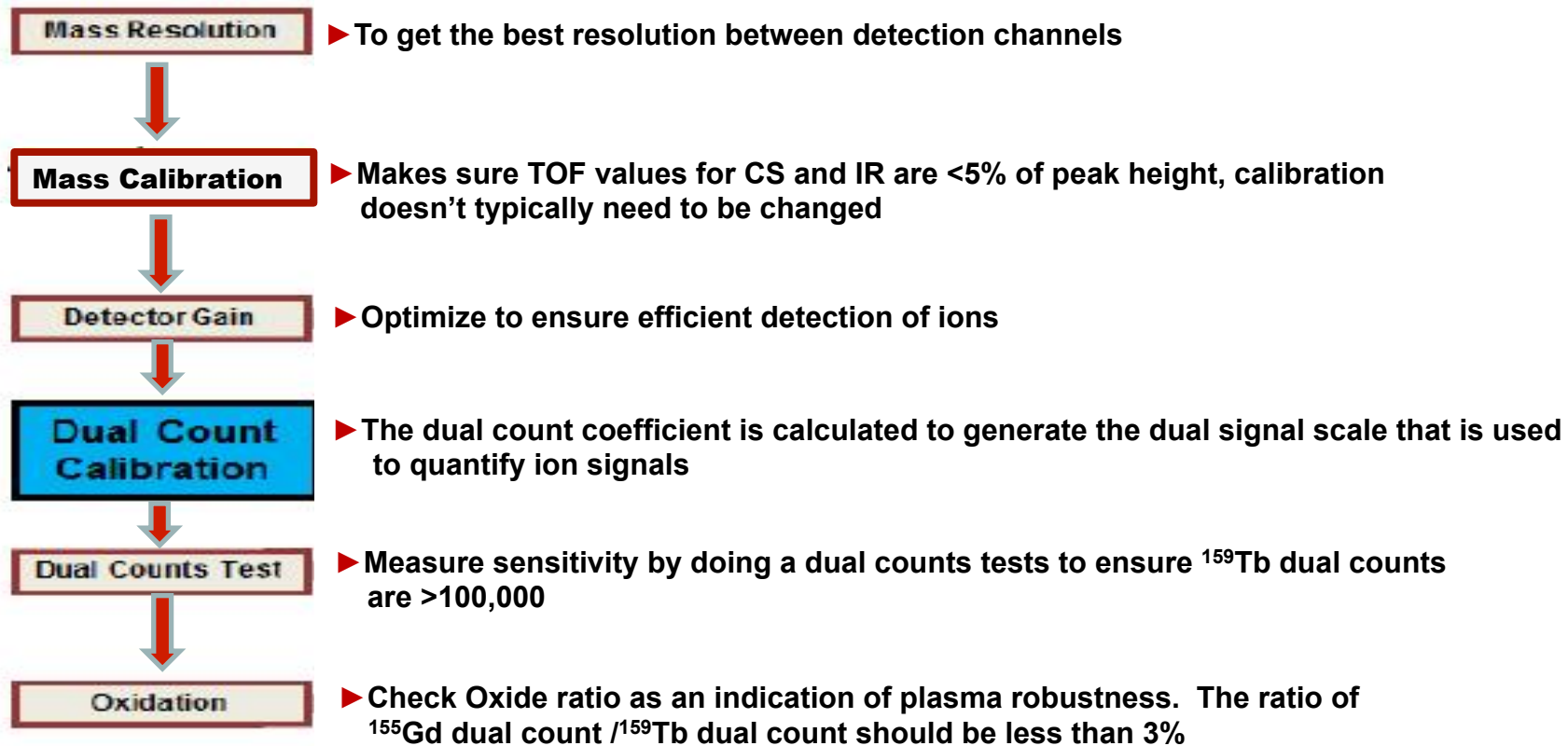
Buttons at the bottom of the dialog are "Start Plasma", "Cancel", and "Stop Plasma".

The log window below the dialog shows the following entries:

- Log 013 10:22:12 AM : Nebulizer Gas On (0.45L/minute).
- 4/7/2013 10:22:12 AM : Makeup Gas to 1 L/minute.
- 4/7/2013 10:22:12 AM : Waiting for 10 seconds.
- 4/7/2013 10:22:22 AM : RFG PREPARE.
- 4/7/2013 10:22:22 AM : Waiting for RFG to warm up (timeout is 100 seconds).

The Windows taskbar at the bottom shows the system tray with the text "Waiting for RFG to warm up (timeout is 100 seconds).", "STARTING PLASMA", and "WARM UP MODE (2013/04/07 10:23:43)". The system clock shows "10:23 AM Sunday 4/7/2013".

Optimization: Performance Check and Tuning



Optimization: Performance Check and Tuning

Tuning
Solution

The screenshot shows the 'Data Acquisition Settings' window with the 'Mass Calibration' tab selected. The table below lists various analytes with their symbols, masses, integration times, intercepts, and slopes. The 'Cs' and 'Tm' rows are highlighted in green, indicating successful calibration. Below the table, there are status messages and control buttons.

Symbol	Mass	Antibody Label	IntegrationTime	Intercept (Instrument)	Slope (Instrument)
Xe	131		21	0.0000	0.0406
Cs	133		21	0.0000	0.0409
La	139		22	0.0000	0.0417
Gd	155		23	0.0000	0.0440
Tb	159		23	0.0000	0.0446
Tm	169		24	0.0000	0.0460
Os	189		25	0.0000	0.0488
Os	190		25	0.0000	0.0489
Ir	191		25	0.0000	0.0490
Ir	193		25	0.0000	0.0493

Instrument Dual Calibration, colors legend

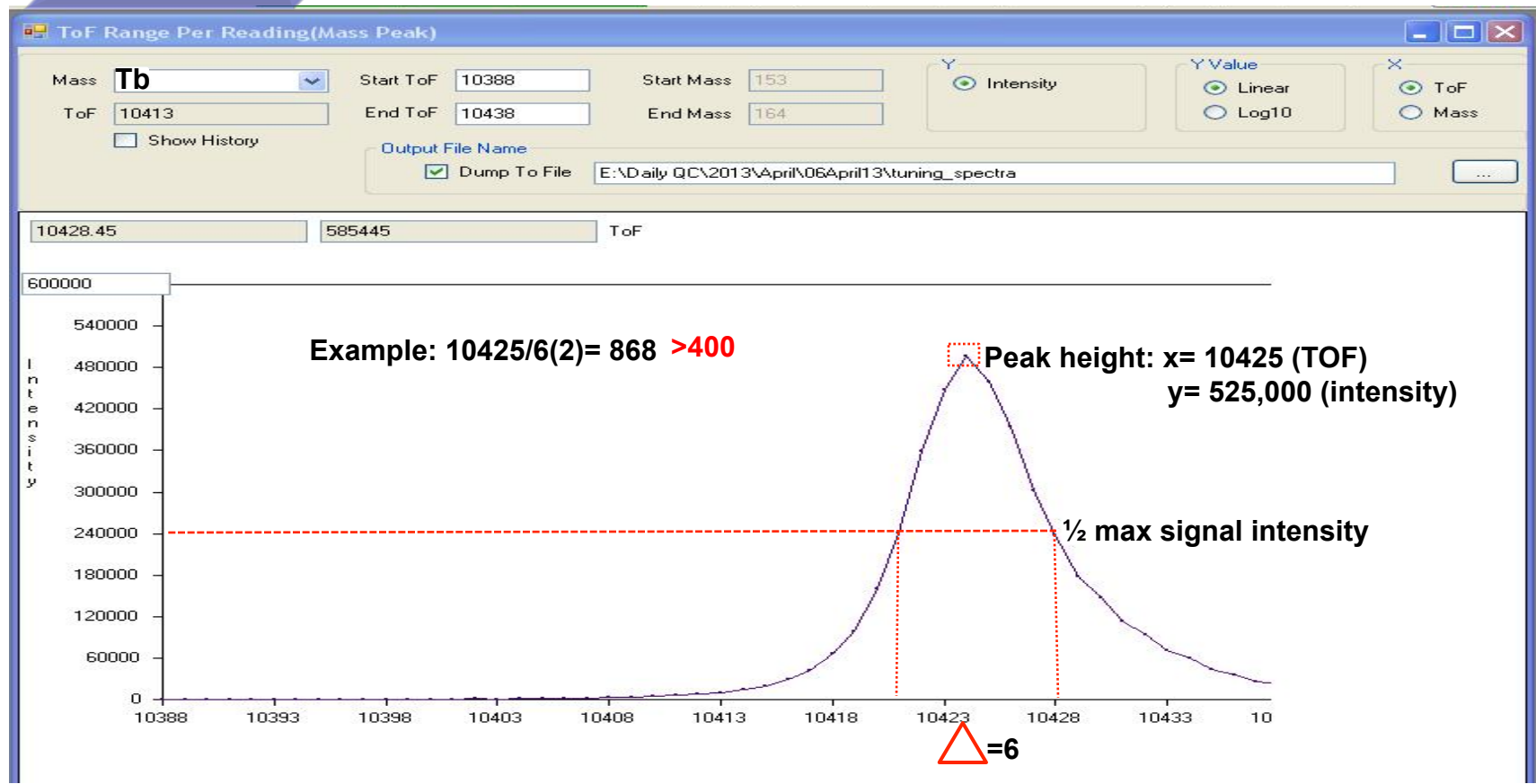
- Problem with analyte
- Mass has been PRECISELY DUAL-calibrated
- Mass has been DUAL-calibrated by EXTRAPOLATION

Buttons: Open Templates, Periodic table, Create a New Template, Reset Intergration Time, Save

Optimization: Performance Check and Tuning

Tuning Solution

Mass Resolution

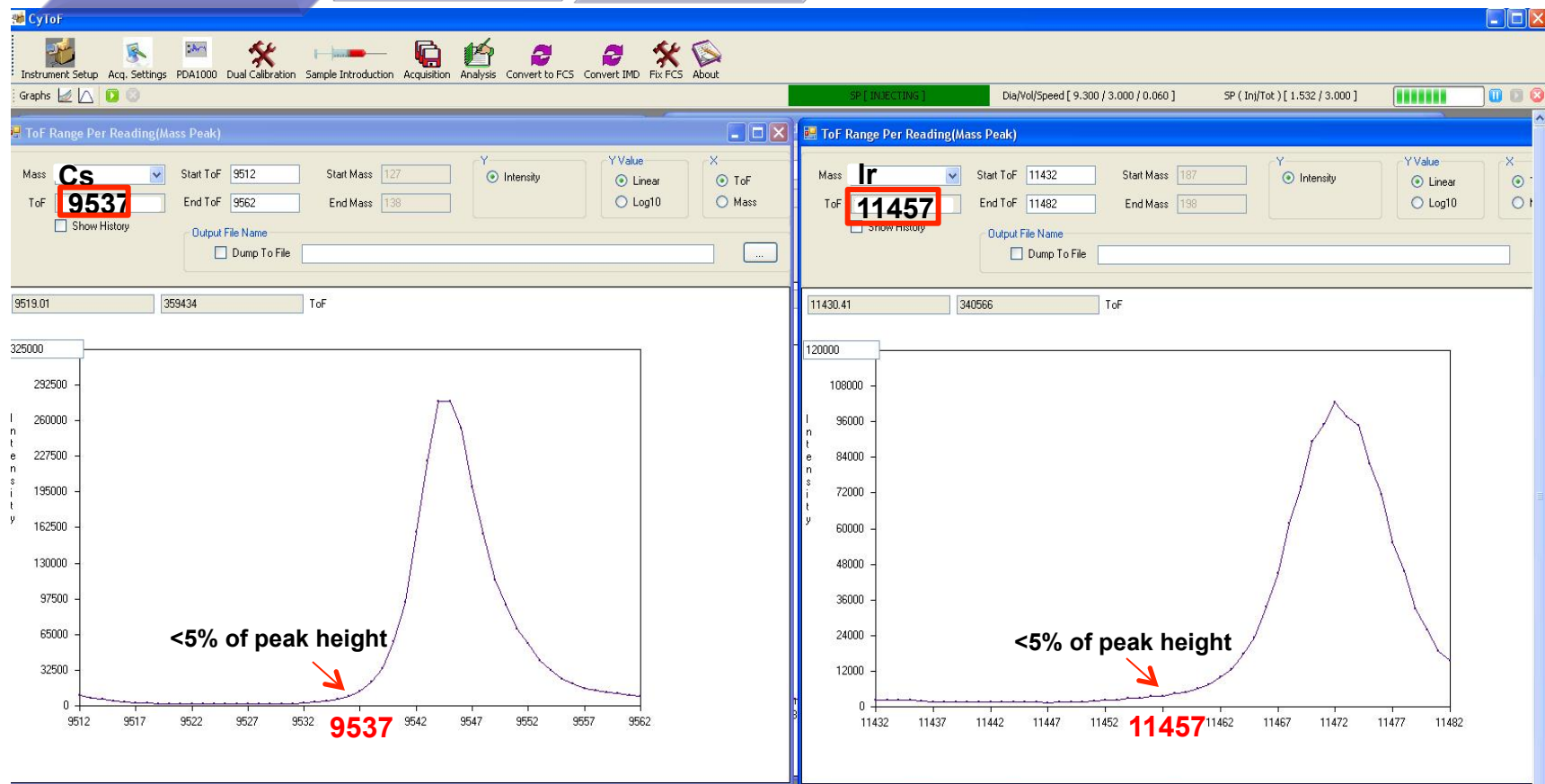


Optimization: Performance Check and Tuning

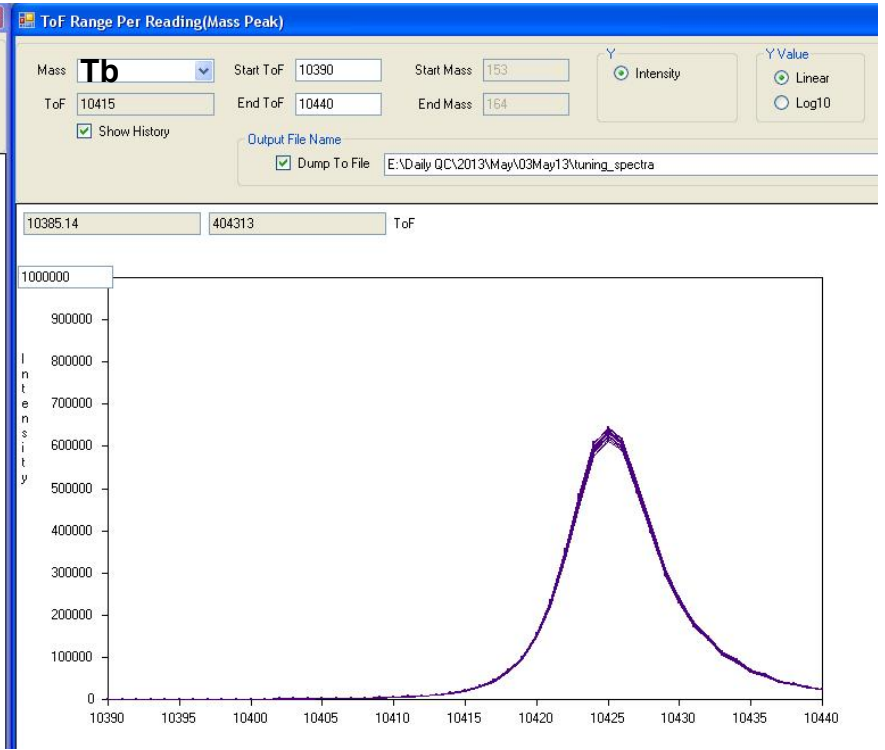
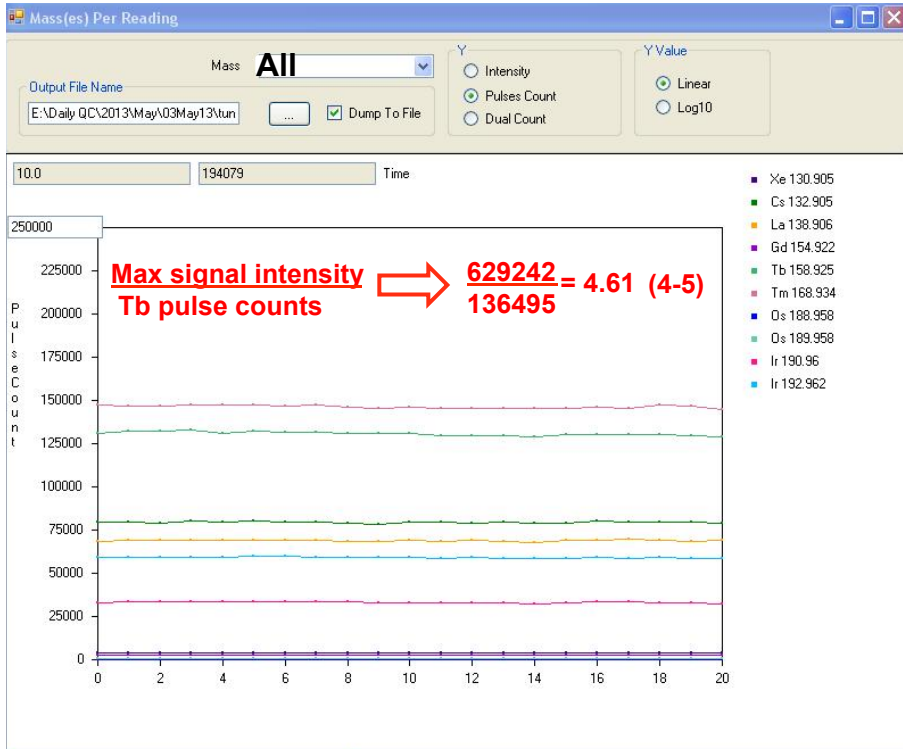
Tuning Solution

Mass Resolution

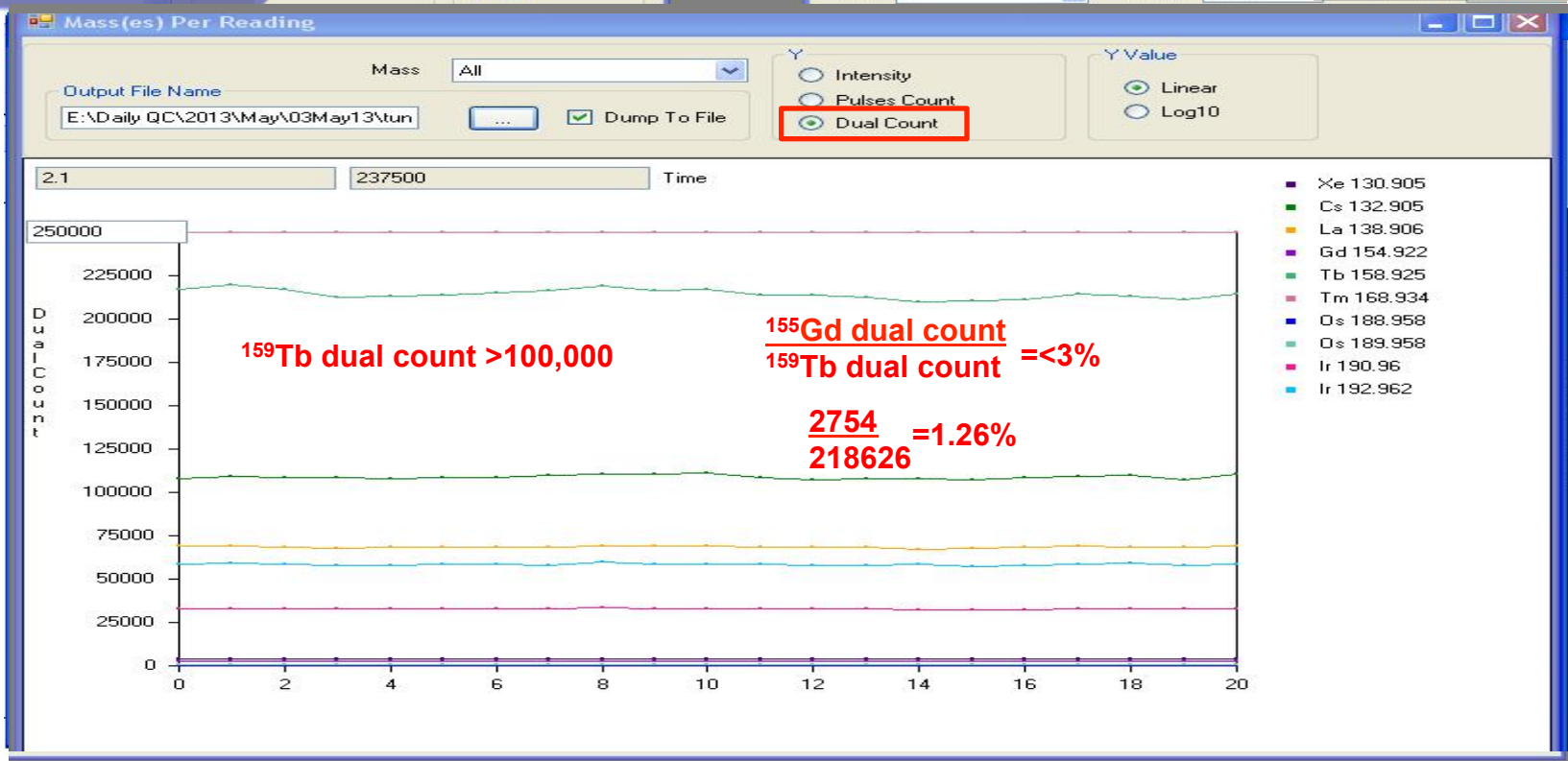
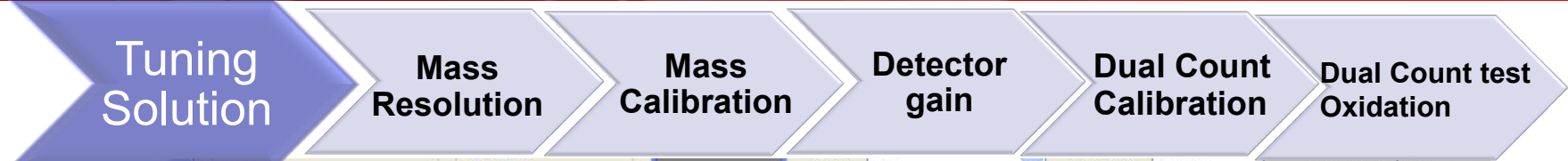
Mass Calibration



Optimization: Performance Check and Tuning



Optimization: Performance Check and Tuning



CYTOF is Ready!

CyTOF Calculations for Instrument Performance/Tuning

Date:

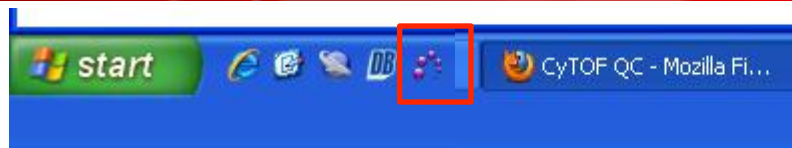
1. **Ratio of Tb:** Intensity of Tb on mass peaks graph _____ /Tb pulse counts _____ = _____ (3.0-5.0)
For troubleshooting, optimize detector voltage

2. **Resolution of Tb:**
 - a. Recorded x value at peak height = _____
 - b. Record y value at peak height = _____ /2 = _____
 - c. x- intercept 1 (at ½ peak height (y))= _____ x-intercept 2= _____ difference= _____
 - d. recorded x value at peak height/2/difference = _____ (should be >400)

3. **Mass Calibration Values for Cs and Ir2:**
 - a. Cs: peak height= _____ x .03= _____ ; x value at .03 peak height = _____
(check against values in Calibration tab or Data Acq settings)
 - b. Ir2: peak height= _____ x .03= _____ ; x value at .03 peak height = _____
(check against values in Calibration tab or Data Acq settings)

4. **Oxide Ratio:**
 - a. Record level of Tb _____ and Gd _____
 - b. $Gd/Tb \times 100 < 3 \rightarrow$ _____ / _____ = _____

Automated QC at Lilly



CyTOF QC - Mozilla Firefox

File Edit View History Bookmarks Tools Help

CyTOF QC

file:///C:/Program Files/EL Lilly/CyTOF QC/CyTOF_Daily_QC.html

QC Table	Pulse Counts	Dual Counts	Mass Intensity	Mass Error	PPM Error
Ratio of ^{159}Tb				4.61	(4-5)
Resolution of ^{159}Tb				708.10	(>400)
Oxide Ratio of ^{159}Tb				1.17%	(<3%)
Mass Calibration for ^{133}Cs				9537.40	(9538)
Mass Calibration for ^{193}Ir				11460.08	(11458)

- 2011
- 2012
- 2013
 - Jan
 - Feb
 - Mar
 - Apr
 - May
 - 1
 - 2
 - 3
 - 2013 May 3 10:23:35AM

start

CyTOF

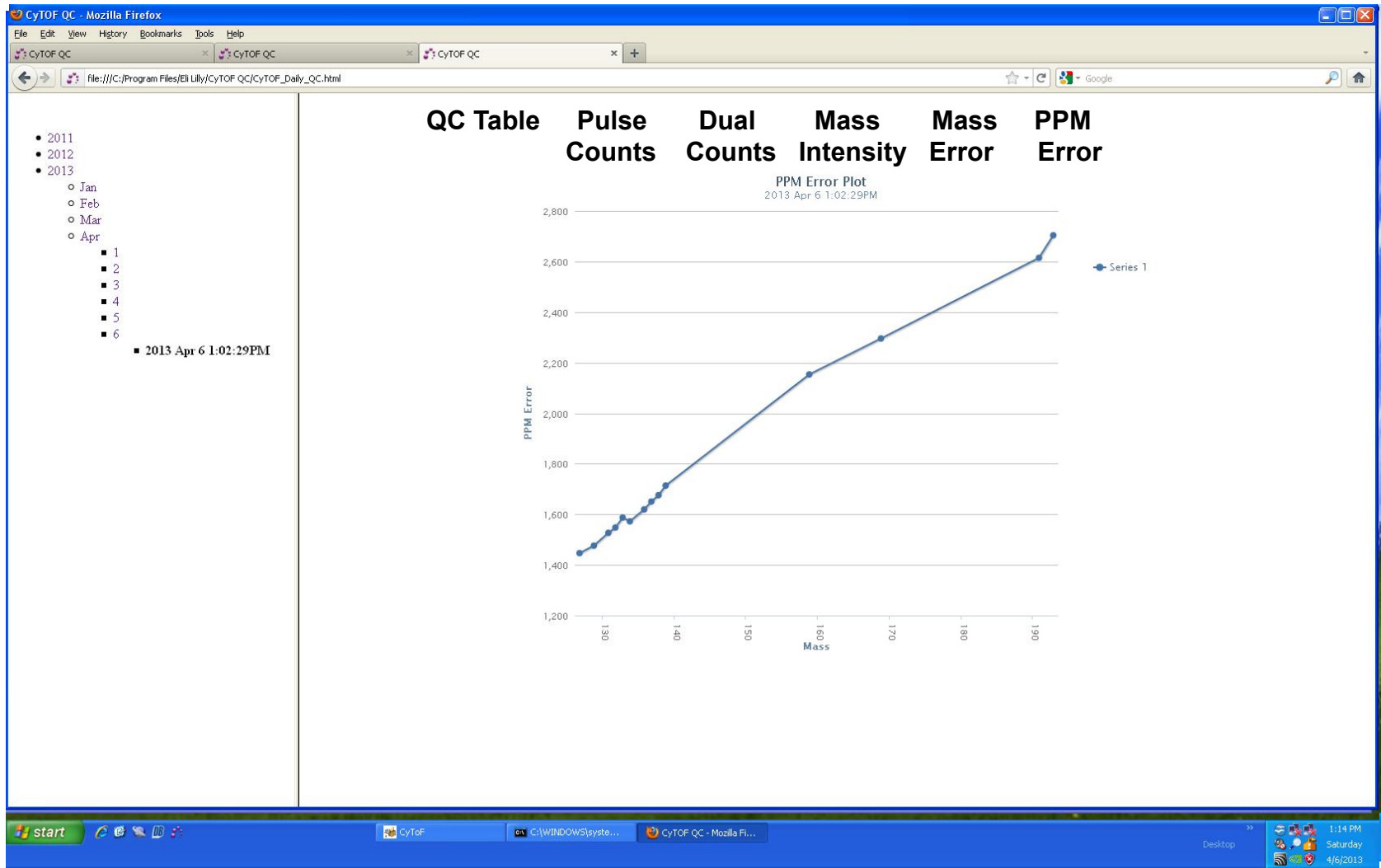
C:\WINDOWS\yste...

CyTOF QC - Mozilla Fi...

Desktop

10:26 AM
Friday
5/3/2013

Automated QC at Lilly



Automated QC at Lilly

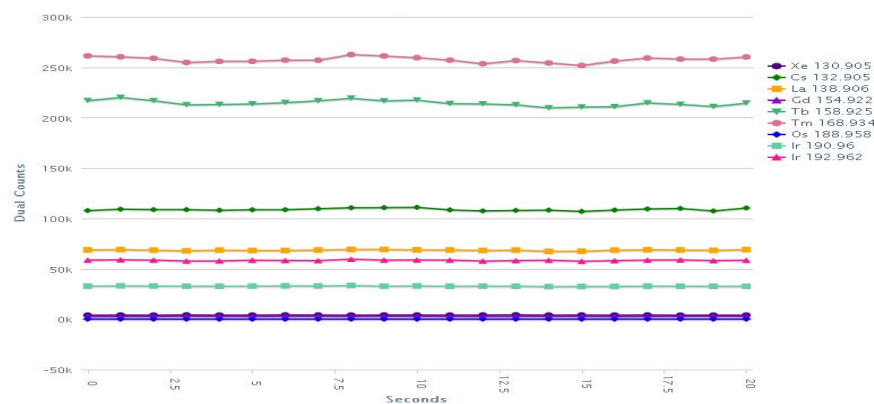
Ratio of ^{159}Tb	4.61	(4-5)
Resolution of ^{159}Tb	708.10	(>400)
Oxide Ratio of ^{159}Tb	1.17%	(<3%)
Mass Calibration for ^{133}Cs	9537.40	(9538)
Mass Calibration for ^{193}Ir	11460.08	(11458)



Dual count calibration

Ratio of ^{159}Tb	4.72	(4-5)
Resolution of ^{159}Tb	722.71	(>400)
Oxide Ratio of ^{159}Tb	1.26%	(<3%)
Mass Calibration for ^{133}Cs	9537.70	(9538)
Mass Calibration for ^{193}Ir	11460.27	(11458)






Dual counts plot



When Specs Are Not Met

<u>Parameter</u>	<u>Observation</u>	<u>Possible Solution</u>
Mass Resolution	<400	Call for service
Mass Calibration	ToF values for Cs and Ir at beginning of peak are >5% of peak height	Verify ToF values and enter new values in the mass calibration tab
Detector Gain	^{159}Tb ratio is <4 or >5	optimize detector voltage
Dual Count Calibration		<ul style="list-style-type: none"> → Check X-Y alignment → Optimize gas flows → Optimize current → Swap nebulizer
Dual Counts Test	^{159}Tb dual count <100,000	
Oxidation	$\frac{^{155}\text{Gd dual count}}{^{159}\text{Tb dual count}} > 3\%$	Optimize gas flows

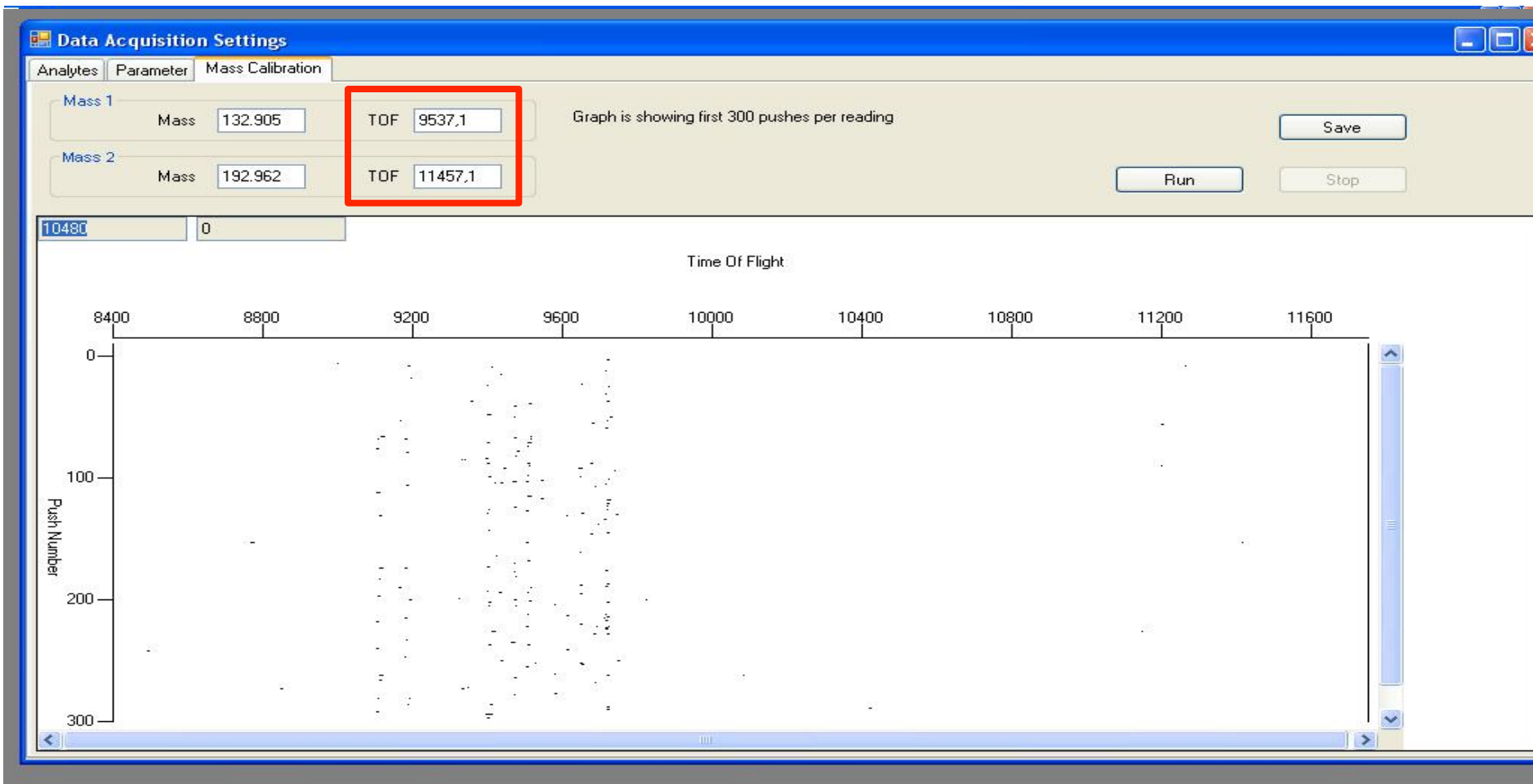
When Specs Are Not Met

<u>Parameter</u>	<u>Observation</u>	<u>Possible Solution</u>
<div style="border: 1px solid black; padding: 2px; text-align: center;">Mass Resolution</div> 	<400	Call for service
<div style="border: 1px solid black; padding: 2px; text-align: center;">Mass Calibration</div> 	ToF values for Cs and Ir at beginning of peak are >5% of peak height	Verify ToF values and enter new values in the mass calibration tab
<div style="border: 1px solid black; padding: 2px; text-align: center;">Detector Gain</div> 	^{159}Tb ratio is <4 or >5	optimize detector voltage
<div style="border: 1px solid black; padding: 2px; text-align: center; background-color: #0070C0; color: white;">Dual Count Calibration</div> 		<ul style="list-style-type: none"> → Check X-Y alignment → Optimize gas flows → Optimize current → Swap nebulizer
<div style="border: 1px solid black; padding: 2px; text-align: center;">Dual Counts Test</div> 	^{159}Tb dual count <100,000	
<div style="border: 1px solid black; padding: 2px; text-align: center;">Oxidation</div>	$\frac{^{155}\text{Gd dual count}}{^{159}\text{Tb dual count}} > 3\%$	Optimize gas flows

When Specs Are Not Met

<u>Parameter</u>	<u>Observation</u>	<u>Possible Solution</u>
Mass Resolution	<400	Call for service
Mass Calibration	ToF values for Cs and Ir at beginning of peak are >5% of peak height	Verify ToF values and enter new values in the mass calibration tab
Detector Gain	^{159}Tb ratio is <4 or >5	optimize detector voltage
Dual Count Calibration		<ul style="list-style-type: none"> → Check X-Y alignment → Optimize gas flows → Optimize current → Swap nebulizer
Dual Counts Test	^{159}Tb dual count <100,000	
Oxidation	$\frac{^{155}\text{Gd dual count}}{^{159}\text{Tb dual count}} > 3\%$	Optimize gas flows

Verify Mass Calibration



When Specs Are Not Met

<u>Parameter</u>	<u>Observation</u>	<u>Possible Solution</u>
Mass Resolution	<400	Call for service
Mass Calibration	ToF values for Cs and Ir at beginning of peak are >5% of peak height	Verify ToF values and enter new values in the mass calibration tab
Detector Gain	^{159}Tb ratio is <4 or >5	optimize detector voltage
Dual Count Calibration		<ul style="list-style-type: none"> Check X-Y alignment Optimize gas flows Optimize current Swap nebulizer
Dual Counts Test	^{159}Tb dual count <100,000	
Oxidation	$\frac{^{155}\text{Gd dual count}}{^{159}\text{Tb dual count}} > 3\%$	Optimize gas flows

Optimize Detector Voltage

The screenshot shows the 'Instrument Setup' window with the 'DAC Channels Setup' tab selected. A table lists various parameters with their 'Actual Min', 'Actual Max', and 'Actual Current Value'. The 'Detector Voltage' row is highlighted with a red box around its 'Actual Current Value' of -1825. Below the table are 'Initialize' and 'Save' buttons. A log window at the bottom contains a message about the Initialize button's effect.

Parameter Name	Actual Min	Actual Max	Actual Current Value	Update	F1	F2
Middle Point	-154.5	0	-120	Set Actual Current Value		
Nebulizer Gas	0	1.5	0.3	Set Actual Current Value		
Detector Bias	-5000	0	-5000	Set Actual Current Value		
Detector Voltage	-5000	0	-1825	Set Actual Current Value		
DD2	0	40	20	Set Actual Current Value		
PulserP	0	713	430	Set Actual Current Value		
PulserN	-703	0	-700	Set Actual Current Value		
Liner	-5000	0	-4999.9	Set Actual Current Value		
Mirror	0	1000	940	Set Actual Current Value		
Makeup Gas	0	2	0.85	Set Actual Current Value		
Current	0	25	3	Set Actual Current Value		
400V1	-410	0	-120	Set Actual Current Value		
Slit	-209	0	-120	Set Actual Current Value		

Initialize Save

Log
4/6/2013 1:38:33 PM : Please, note that when Initialize button is pressed - Detector Voltage, Liner, Bias and Mirror will all be set to 0.

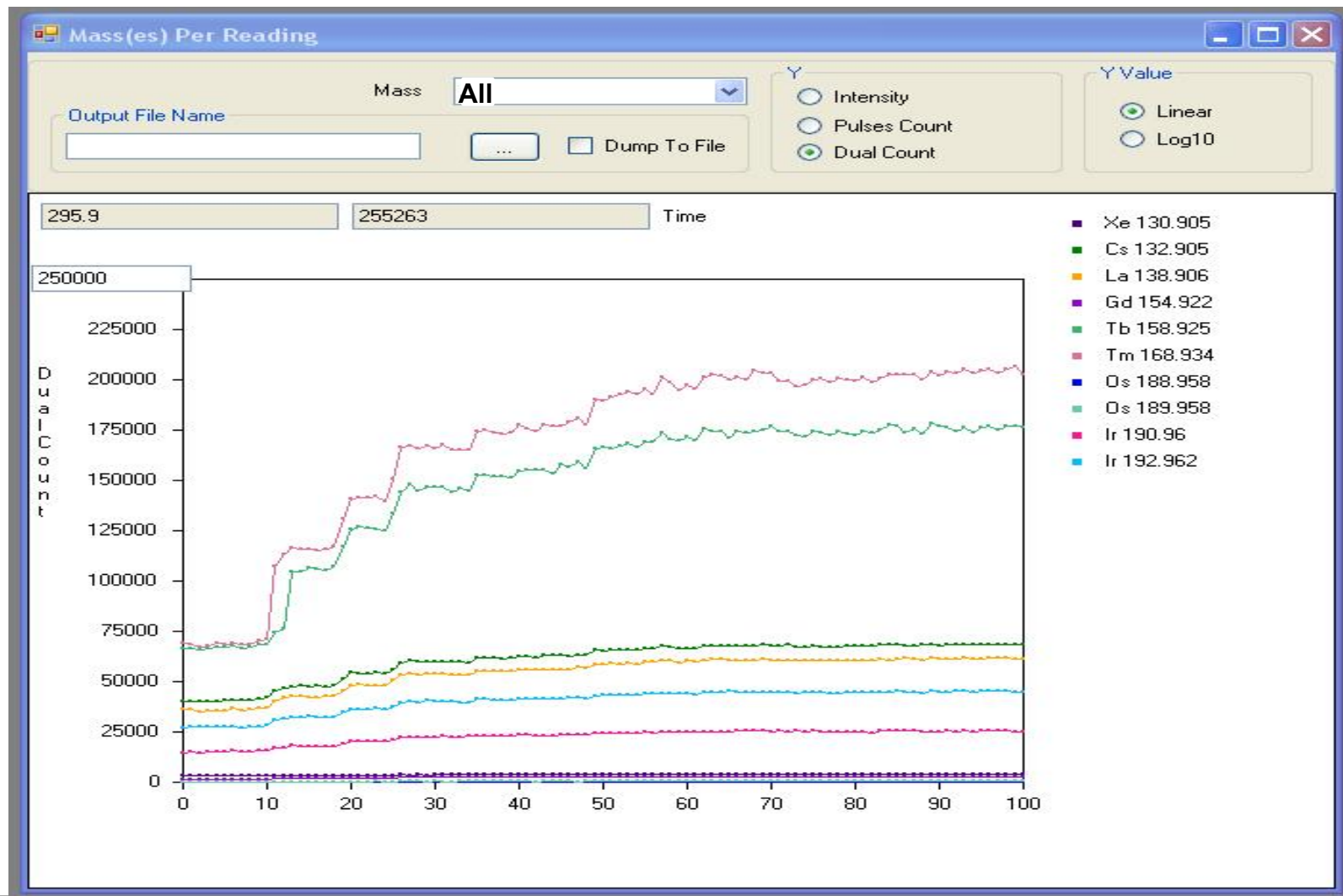
When Specs Are Not Met

<u>Parameter</u>	<u>Observation</u>	<u>Possible Solution</u>
<p>Mass Resolution</p> <p>Mass Calibration</p> <p>Detector Gain</p> <p>Dual Count Calibration</p> <p>Dual Counts Test</p> <p>Oxidation</p>	<p><400</p> <p>ToF values for Cs and Ir at beginning of peak are >5% of peak height</p> <p>¹⁵⁹Tb ratio is <4 or >5</p> <p>¹⁵⁹Tb dual count <100,000</p> <p>$\frac{^{155}\text{Gd dual count}}{^{159}\text{Tb dual count}} > 3\%$</p>	<p>Call for service</p> <p>Verify ToF values and enter new values in the mass calibration tab</p> <p>optimize detector voltage</p> <ul style="list-style-type: none"> Check X-Y alignment Optimize gas flows Optimize current Swap nebulizer Optimize gas flows

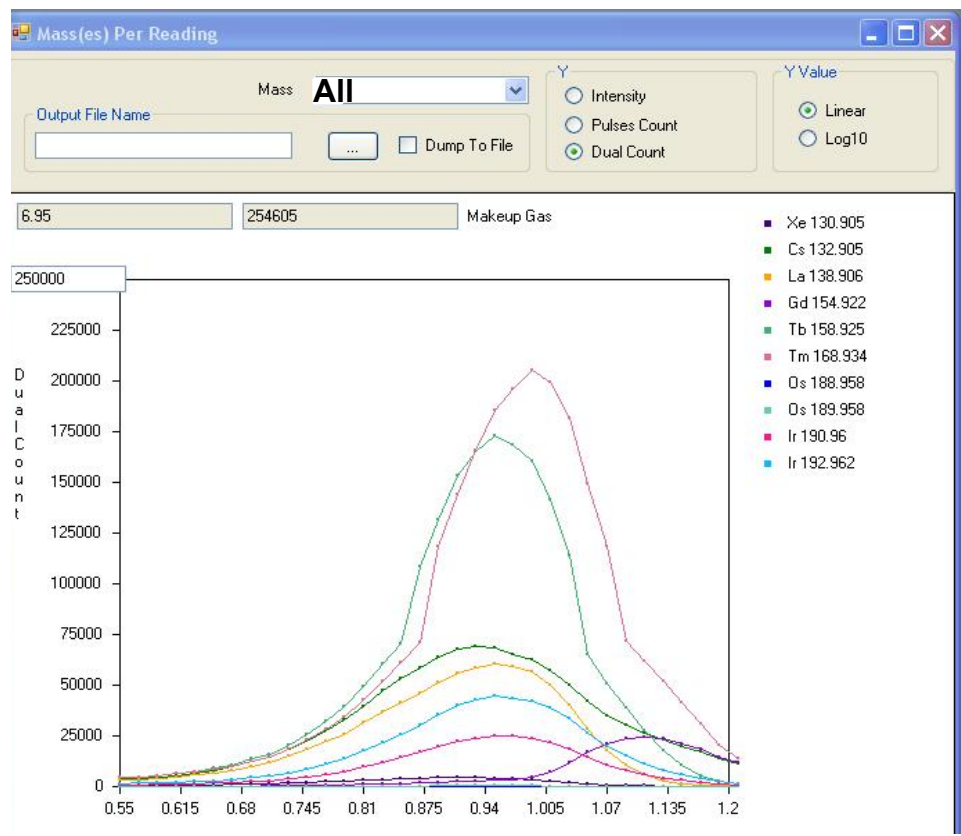
When Specs Are Not Met

<u>Parameter</u>	<u>Observation</u>	<u>Possible Solution</u>
Mass Resolution	<400	Call for service
Mass Calibration	ToF values for Cs and Ir at beginning of peak are >3% of peak height	Verify ToF values and enter new values in the mass calibration tab
Detector Gain	^{159}Tb ratio is <4 or >5	optimize detector voltage
Dual Count Calibration		<ul style="list-style-type: none"> Check X-Y alignment Optimize gas flows Optimize current Swap nebulizer
Dual Counts Test	^{159}Tb dual count <100,000	
Oxidation	$\frac{^{155}\text{Gd dual count}}{^{159}\text{Tb dual count}} > 3\%$	Optimize gas flows

X-Y Alignment of the Interface



Optimize Gas Flows



Instrument Setup

Card Cage | RFG Controller | DAC Channels Setup | Ports & Commands Setup | Sampler Setup

Parameter Name	Actual Min	Actual Max	Actual Current Value	Update
Middle Point	-154.5	0	-120	Set Actual Current Value
Nebulizer Gas	0	1.5	0.15	Set Actual Current Value
Detector Bias	-5000	0	-5000	Set Actual Current Value
Detector Voltage	-5000	0	-1825	Set Actual Current Value
DD2	0	40	20	Set Actual Current Value
PulserP	0	713	430	Set Actual Current Value
PulserN	-703	0	-700	Set Actual Current Value
Liner	-5000	0	-4999.9	Set Actual Current Value
Mirror	0	1000	940	Set Actual Current Value
Makeup Gas	0	2	0.85	Set Actual Current Value
Current	0	25	3	Set Actual Current Value
400V1	-410	0	-120	Set Actual Current Value
Slit	-209	0	-120	Set Actual Current Value

Initialize Save

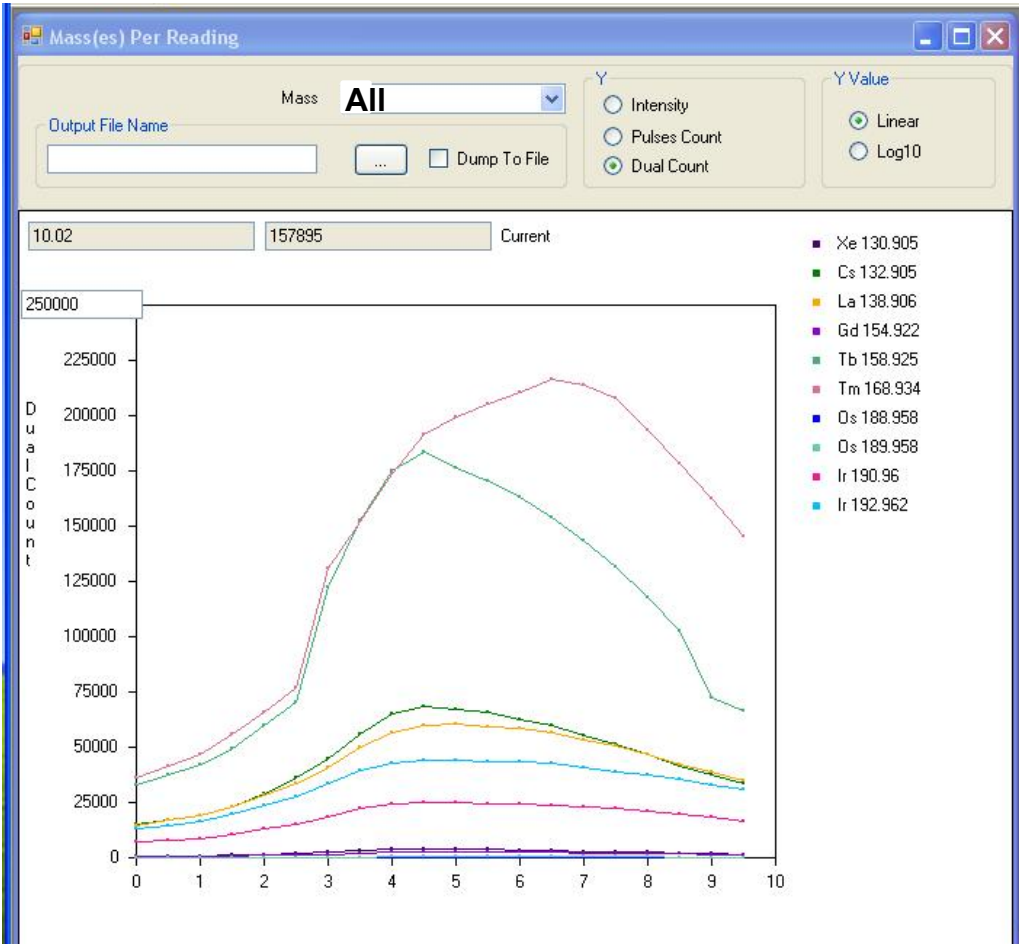
Log

4/6/2013 1:38:33 PM : Please, note that when Initialize button is pressed - Detector Voltage, Liner, Bias and M

4/6/2013 1:50:19 PM : Executing command : Nebulizer Gas [ActualCurrentValue = 0.15]

Date	Nebulizer Gas Value	Optimal Makeup Gas Value	Tb159 dual count	Gd155 dual count	Mass155/Tb159
2-May-13	0.15	1.008	208553	3947	0.018925645
	0.2	0.95	219079	3947	0.018016332
	0.25	0.88	219421	3947	0.017988251
	0.3	0.85	225000	4605	0.020466667
	0.35	0.77	225658	3289	0.014575154

Optimize Current

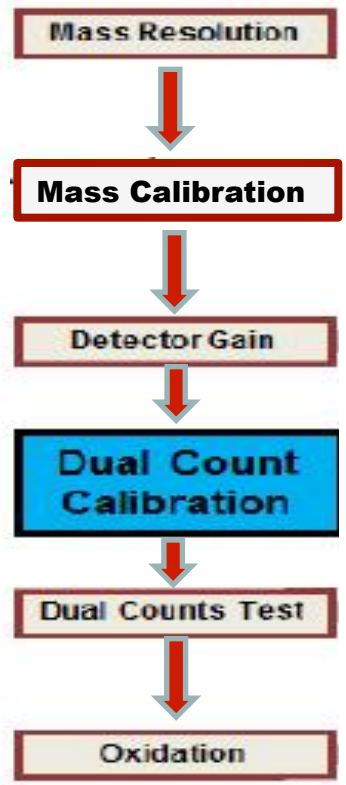


Instrument Setup

Card Cage RFG Controller DAC Channels Setup Ports & Commands Setup Sampler Setup

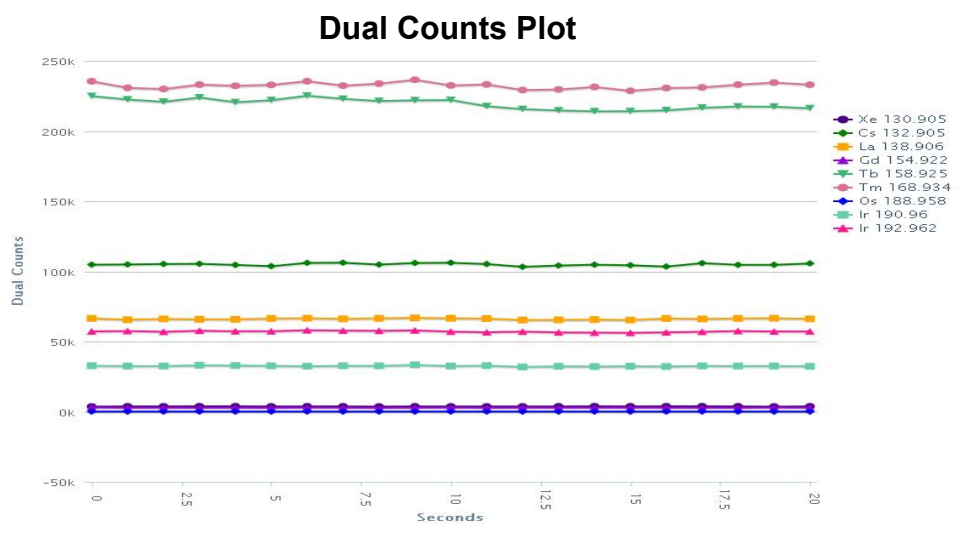
Parameter Name	Actual Min	Actual Max	Actual Current Value	Update
Middle Point	-154.5	0	-120	<input type="button" value="Set Actual Current Value"/>
Nebulizer Gas	0	1.5	0.15	<input type="button" value="Set Actual Current Value"/>
Detector Bias	-5000	0	-5000	<input type="button" value="Set Actual Current Value"/>
Detector Voltage	-5000	0	-1825	<input type="button" value="Set Actual Current Value"/>
DO2	0	40	20	<input type="button" value="Set Actual Current Value"/>
PulserP	0	713	430	<input type="button" value="Set Actual Current Value"/>
PulserN	-703	0	-700	<input type="button" value="Set Actual Current Value"/>
Liner	-5000	0	-4999.9	<input type="button" value="Set Actual Current Value"/>
Mirror	0	1000	940	<input type="button" value="Set Actual Current Value"/>
Makeup Gas	0	2	0.85	<input type="button" value="Set Actual Current Value"/>
Current	0	25	3	<input type="button" value="Set Actual Current Value"/>
400V1	-410	0	-120	<input type="button" value="Set Actual Current Value"/>
Slit	-209	0	-120	<input type="button" value="Set Actual Current Value"/>

Re-Check QC



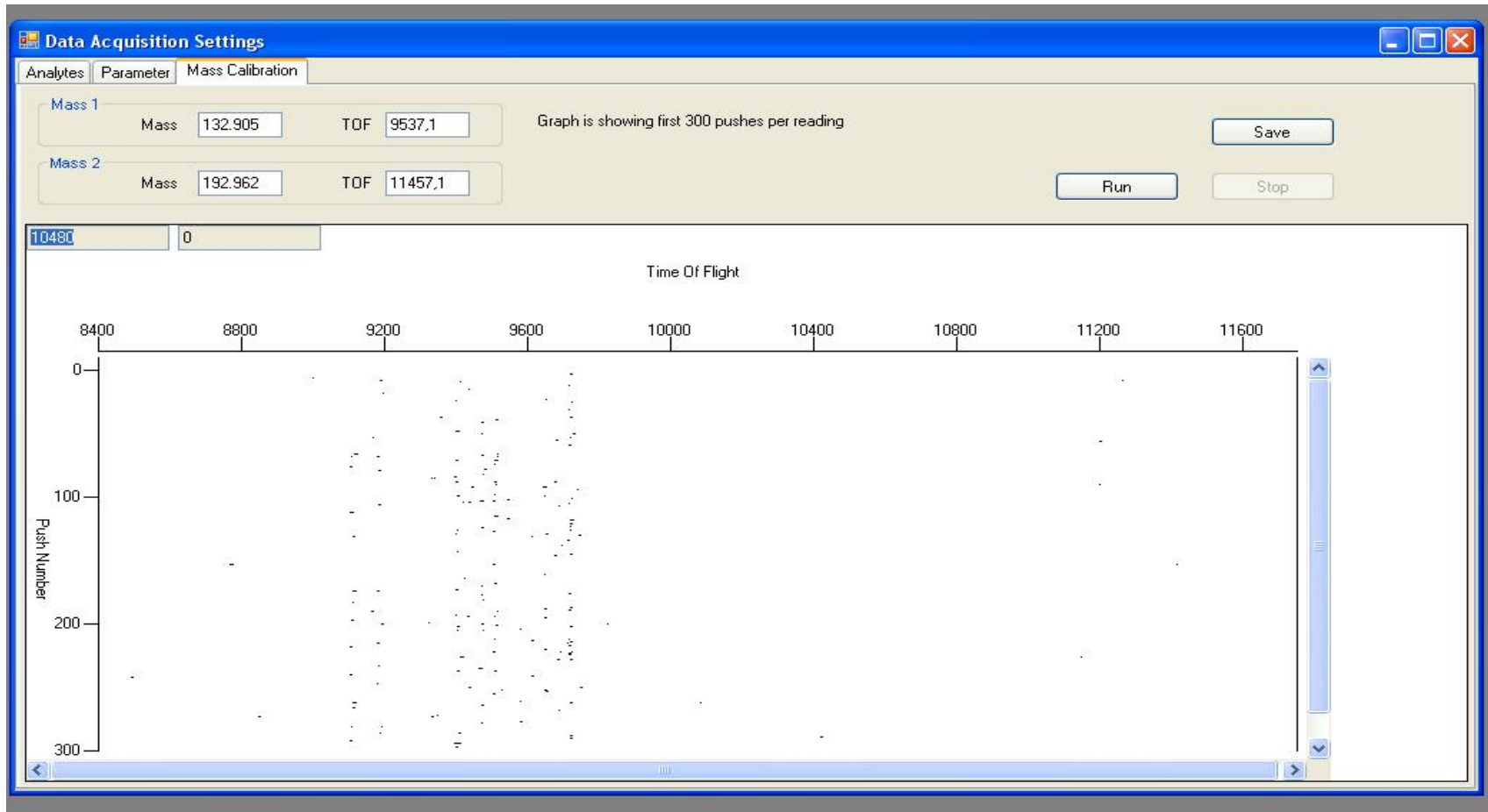
Ratio of ^{159}Tb	4.58	(4-5)
Resolution of ^{159}Tb	727.77	(>400)
Oxide Ratio of ^{159}Tb	2.05%	(<3%)
Mass Calibration for ^{133}Cs	9537.28	(9538)
Mass Calibration for ^{193}Ir	11459.98	(11458)

[QC Tables](#)
 [Pulses_Count Plot](#)
 [Dual Count Plot](#)
 [Mass Intensity Plot](#)
 [Mass Error Plot](#)
 [PPM Error Plot](#)

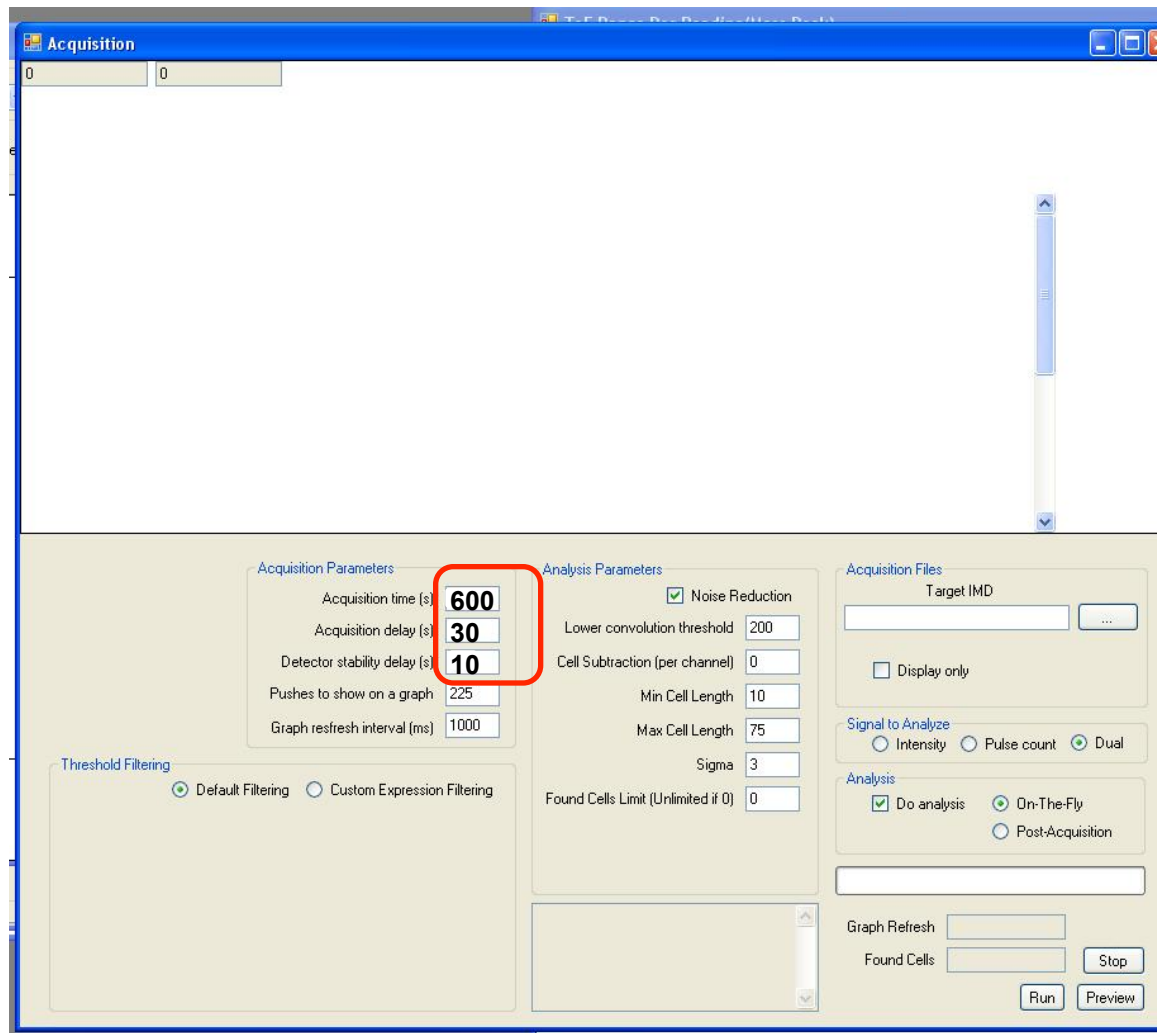


Running Samples: User Guidelines

- Make sure sample loop is clean: run H2O, check Mass Cal screen to verify

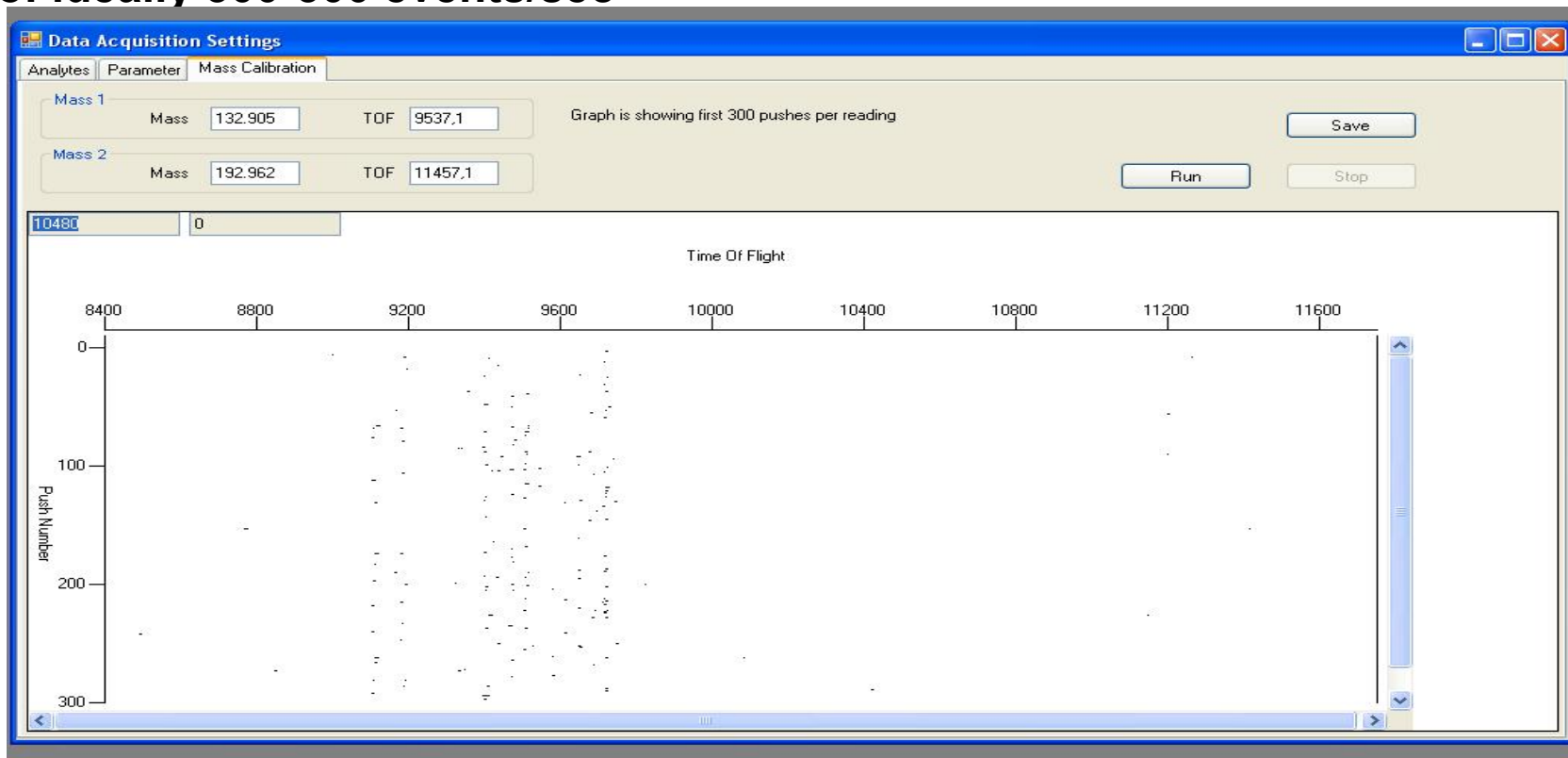


Running Samples: User Guidelines



Running Samples: User Guidelines

- Filter samples and count cells. Resuspend cells to achieve collection rate of ideally 300-500 events/sec



- Clean with H₂O between samples to minimize carryover
- Clean instrument when done running samples (Wash solution and H₂O)

Instrument Shutdown

The screenshot displays the 'Instrument Setup' window with the 'RFG Controller' tab selected. The 'Plasma Management' section shows the following details:

- RFG Status:** PLASMA MODE [2013/04/06 14:30:12] (indicated by a green bar)
- Plate current, A:** 0.525
- Plate voltage, V:** 3485
- Factual Power Level, W:** 1318.567
- Power:** 1300 (with a 'Set' button next to it)

At the bottom of the Plasma Management section, there are three buttons: 'Start Plasma', 'Cancel', and 'Stop Plasma'. The 'Stop Plasma' button is highlighted with a red rectangular box.

Below the Plasma Management section is a log window with the following entries:

- Log 013 2:05:44 PM : Executing command : Nebulizer Gas [ActualCurrentValue = 0.3]
- 4/6/2013 2:07:55 PM : Executing command : Nebulizer Gas [ActualCurrentValue = 0.25]
- 4/6/2013 2:09:35 PM : Executing command : Nebulizer Gas [ActualCurrentValue = 0.35]
- 4/6/2013 2:11:51 PM : Executing command : Nebulizer Gas [ActualCurrentValue = 0.3]
- 4/6/2013 2:11:54 PM : Executing command : Makeup Gas [ActualCurrentValue = 0.85]

Instrument Shutdown

Instrument Setup

Card Cage | RFG Controller | DAC Channels Setup | Ports & Commands Setup | Sampler Setup

Plasma Management

RFG Status

NO RESPONSE FROM RFG [2013/04/06 14:32:44]

Plate current, A: 0.000

Plate voltage, V: 0

Factual Power Level, W: 0.000

Power: 1300 [Set]

Start Plasma [] Stop Plasma []

Plasma Stop Sequence has been completed successfully. Please, remove nebulizer.

OK

Log 013 2:32:42 PM : Nebulizer Gas Off.

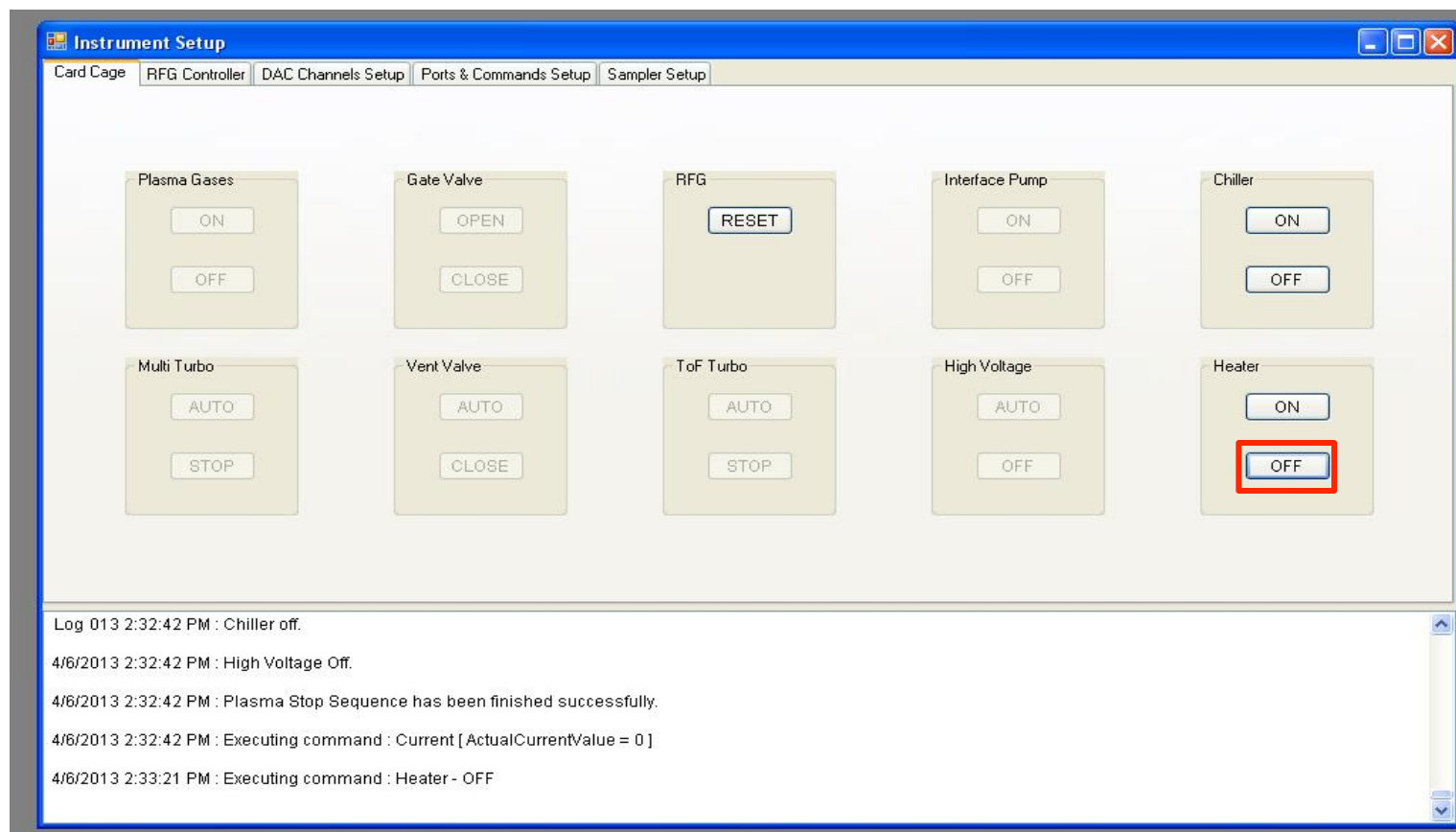
4/6/2013 2:32:42 PM : Chiller off.

4/6/2013 2:32:42 PM : High Voltage Off.

4/6/2013 2:32:42 PM : Plasma Stop Sequence has been finished successfully.

4/6/2013 2:32:42 PM : Executing command : Current [ActualCurrentValue = 0]

Instrument Shutdown



- Turn off HPLC
- Remove nebulizer and store in 3% Citranox

Troubleshooting: Common Issues

Problem

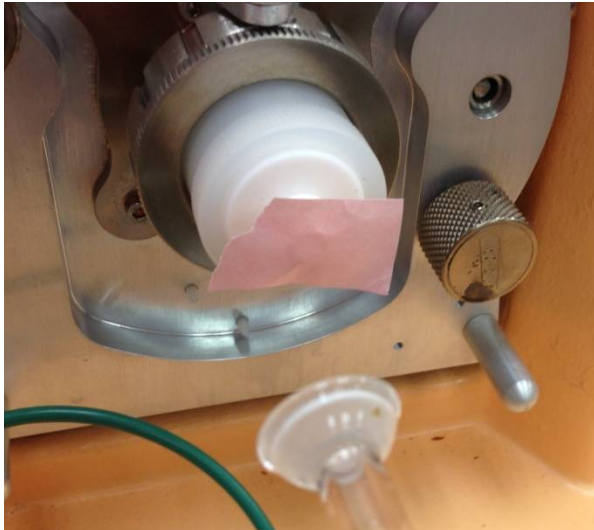
1. Plasma won't ignite

Cause

Argon off
Argon not pure enough
Incorrect Gas?
Air Leak

Solution

Turn it on
Use Ultra High Purity Argon
Double check gas
Localize source



Plasma ignites



Look for air leak in the area of sample introduction

Plasma does not ignite

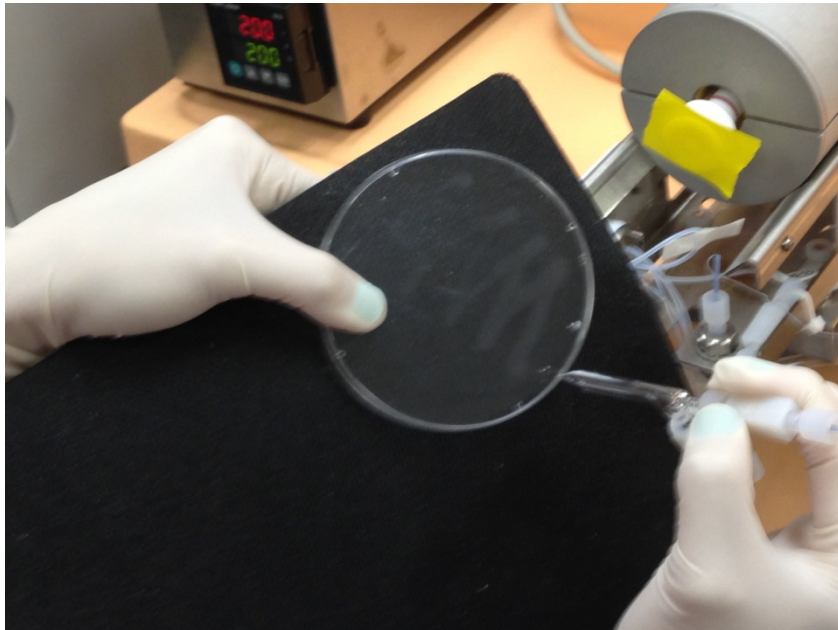


Check the torch, injector, coil for condensation

Troubleshooting: Common Issues

Problem

2. No/low signal



Cause

Sample line
capillary pinched

Sample line
capillary inserted
improperly

Clogged nebulizer

Insufficient gas
flows

Solution

Inspect capillary
line

Reinsert capillary

Check spray/swap
nebulizer

Check gas flows

Troubleshooting: Unusual Circumstances

Problem

1.



Cause

- Leak in one of the argon lines
- Arcing because the coil not aligned
- Oxidation on the coils

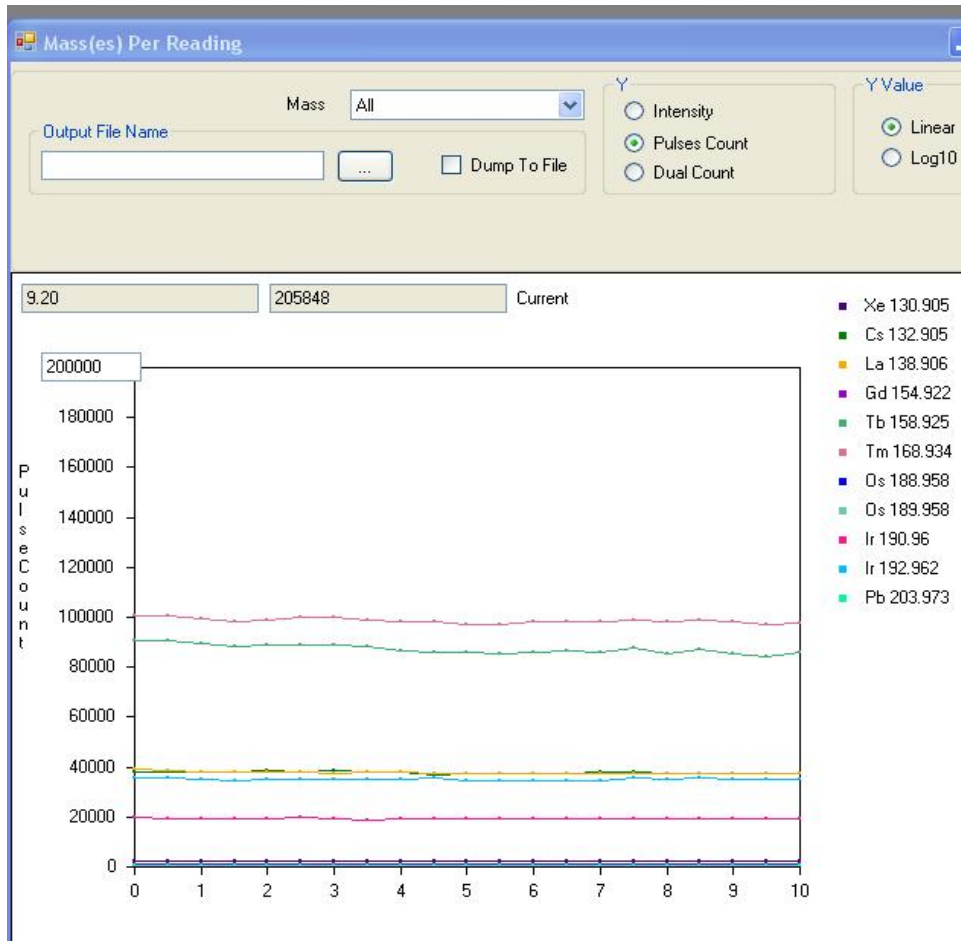
Solution

- Pankaj came out and found the leak. Replaced torch and replaced RFG coil
- Clean/Replace coil

Troubleshooting: Unusual Circumstances

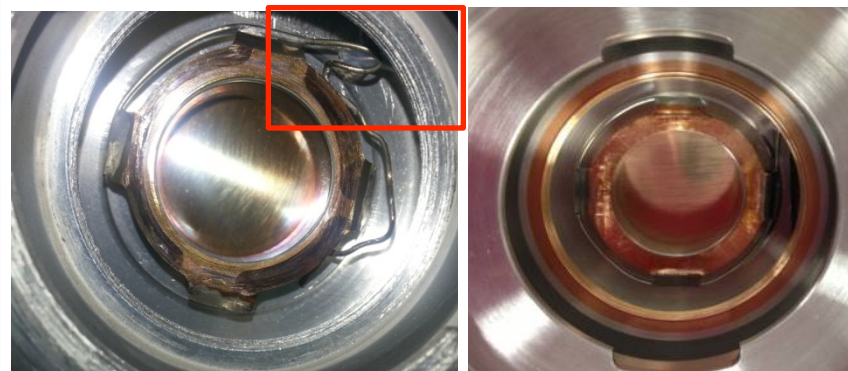
Problem

2.



Cause

Poor contact of skimmer/reducer with the contact ring on the interface. This may be due to oxidation on the contact ring or on the reducer itself.



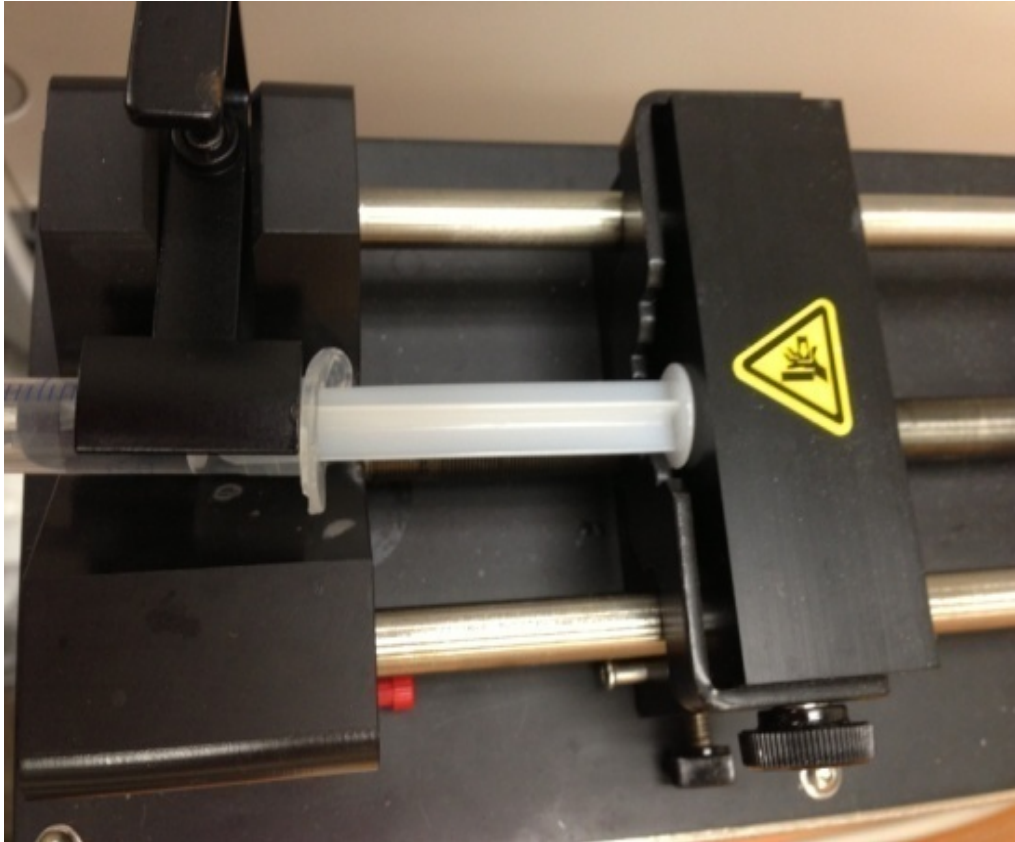
Solution

Vigorously cleaned the contact ring on the interface with methanol. Eventually, Daniel came out to replace the interface

Troubleshooting: Unusual Circumstances

Problem

3.



Cause

Originally thought it was a faulty syringe pump. Turned out to be a bad valve.

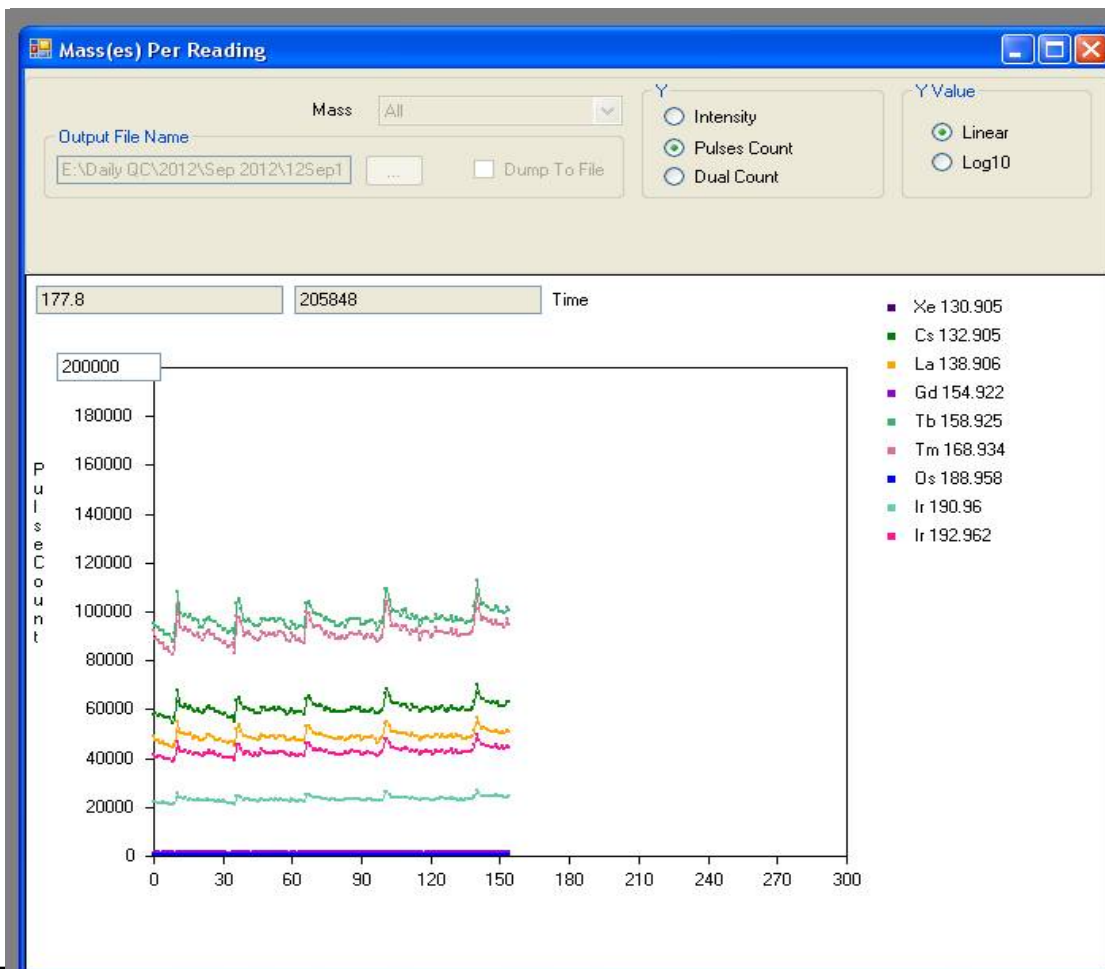
Solution

Replaced the entire valve assembly

Troubleshooting: Unusual Circumstances

Problem

4.



Cause

Partially clogged/
dirty nebulizer

Sample capillary
not positioned
properly

Bad syringe

Solution

Clean/swap nebulizer

Reinsert
capillary

Replace syringe

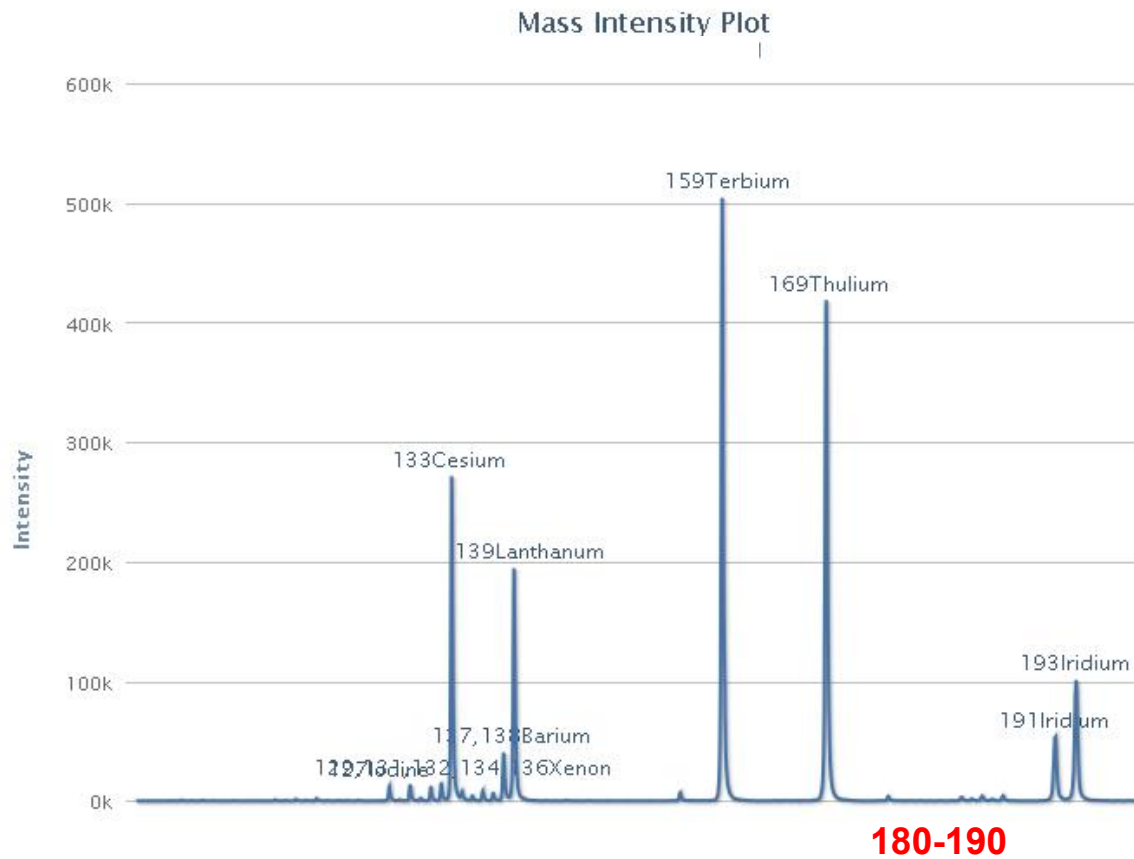
Troubleshooting: Unusual Circumstances

Problem

Cause

Solution

5.



Tungsten
contamination;
but from where?

Cleaned ignitor
pin with
sandpaper

Progress Report: 1 ½ years later

Lilly CyTOF Projects:

- Multi-parametric, high content immunophenotyping
- LRAP with the Sanford Burnham Institute to investigate signaling pathways

What have we done so far?

>100 expts: 60% validations & optimizations
40% phenotyping

Validated core panel:
16 parameters

*Replaced Rhodium
with Cisplatin for
viability

Joined Cytobank;
Transitioning from FlowJo
to Spade for data analysis

ICP-MS
characterization

Acknowledgements

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