Mossbauer User Guide

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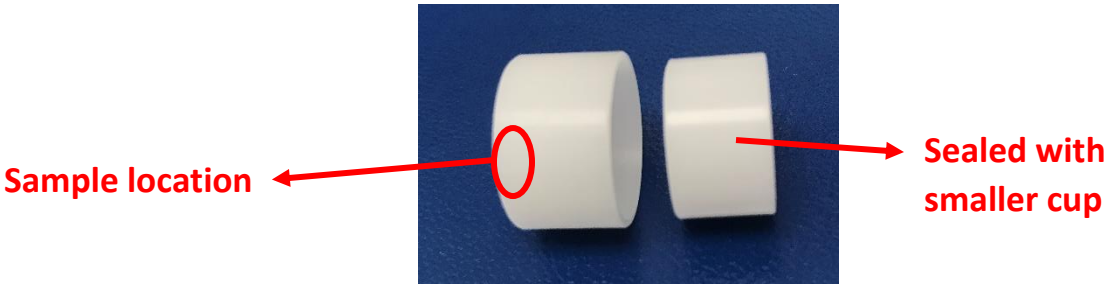
1. Sample Handling:

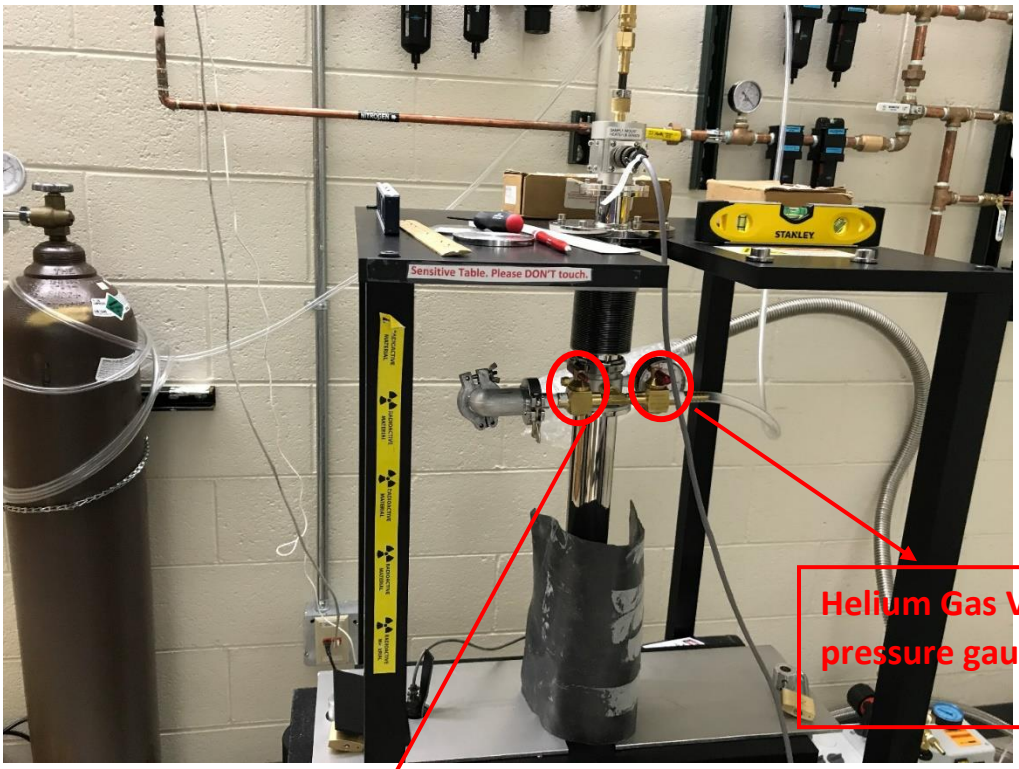
Put your sample into sample cup (white color) and seal it with the smaller cup. You can purchase these sample cups in our machine shop.



Put sample cup into the bottom end of sample rod, with sample location facing towards the radiation gamma source (S arrow shows the direction).

Use the set screws to hold the sample cup and make sure it is tight. If you are planning to do low temperature experiments, you need to cool the sample cup with your sample first to make sure sample cup won't break under low temperature.

Before inserting the sample rod, make sure the power of sample chamber vacuum pump is on(white power strip). Slowly open the helium gas valve to flush the sample chamber and let the pressure raise to atmosphere pressure (at 0 in the gauge). *In this way, when you open the cap of sample chamber, there is positive helium gas flushing out to prevent air/moisture getting into sample chamber.* Loose 4 screws on top of sample chamber **(there are 4 metal washers too!!)** and open the cap. **Leave the black O-ring on top of sample chamber.**

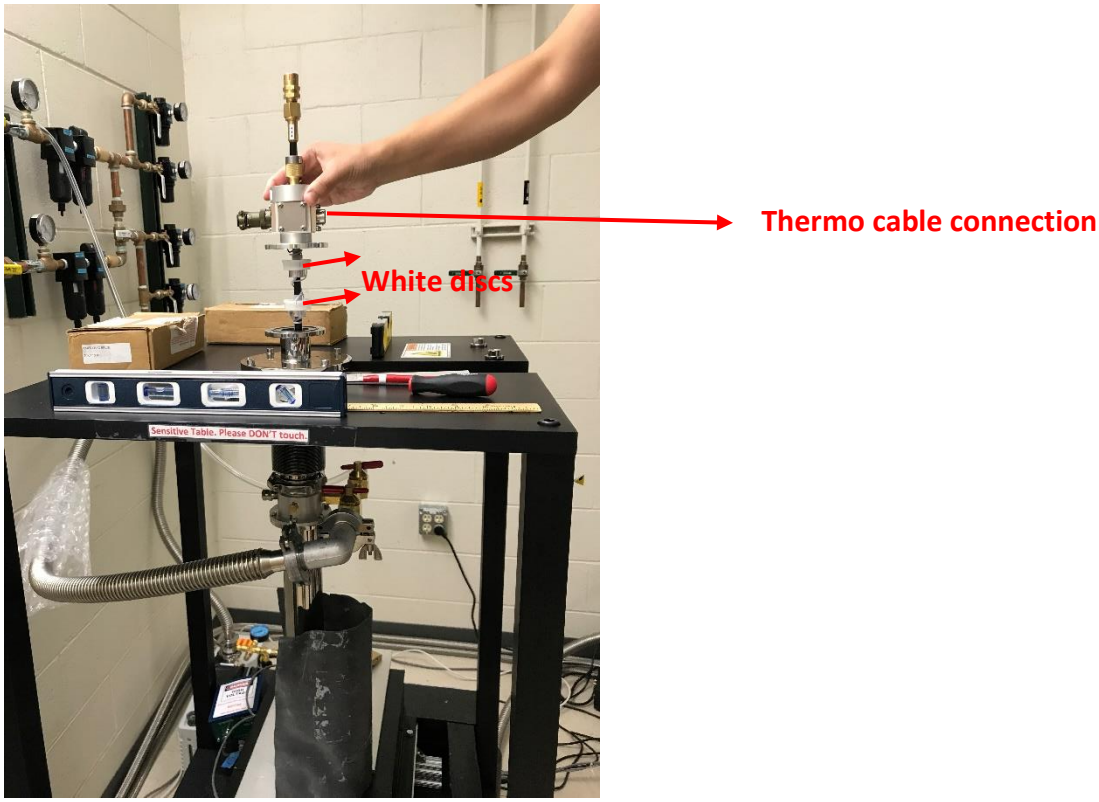


Helium Gas Valve and pressure gauge

Vacuum pump valve for sample chamber

Power of vacuum pump

Now you can insert the sample rod into sample chamber and keep it straight. *You may feel some resistance when two white discs hit the top of sample chamber.* **Please gently push through these two spots** and try to avoid rocking the Mossbauer table.



Put the four screws back on top of sample rod and drive them to seal sample chamber but DON'T over tighten them yet. Close the helium gas valve and then slowly open the vacuum pump valve until it is fully open. You will notice the pressure gauge shows -28 to -30 inHg. Tighten the four screws on top of sample rod now. Close the vacuum pump valve. Put the thermo cable on top of sample rod(you need to twist the cover of connector from cable to lock it). You can collect your data now.

Sample exchange or finish procedure: Turn off all the heaters in temperature controller. Disconnect the thermocable from sample rod. Before you pull out the sample rod, slowly open the helium gas value to fill the sample chamber. So no air moisture will get into sample chamber when you open it. Loose 4 screws on top of sample chamber. Pull sample rod out

and keep it straight. **Leave the black O-ring on top of sample chamber.** Put the cap on (no screws needed for sample exchange in short period of time). If you are done with samples, put the four screws back on top of sample rod and drive them to seal sample chamber. Slowly open the vacuum pump valve while close the helium gas feed valve at the same time. Tighten the four screws on top of sample rod again

When cryostat and sample chamber are both cold (<100K), there are a few additional notes on sample handling:

1) Pre-cool your sample (on the sample rod) with liquid nitrogen before insert into sample chamber if the sample chamber is already cold;
2) After you completely pull out the sample rod, move it off the hole of cryostat to avoid liquid O2 or N2 dripping into sample chamber.

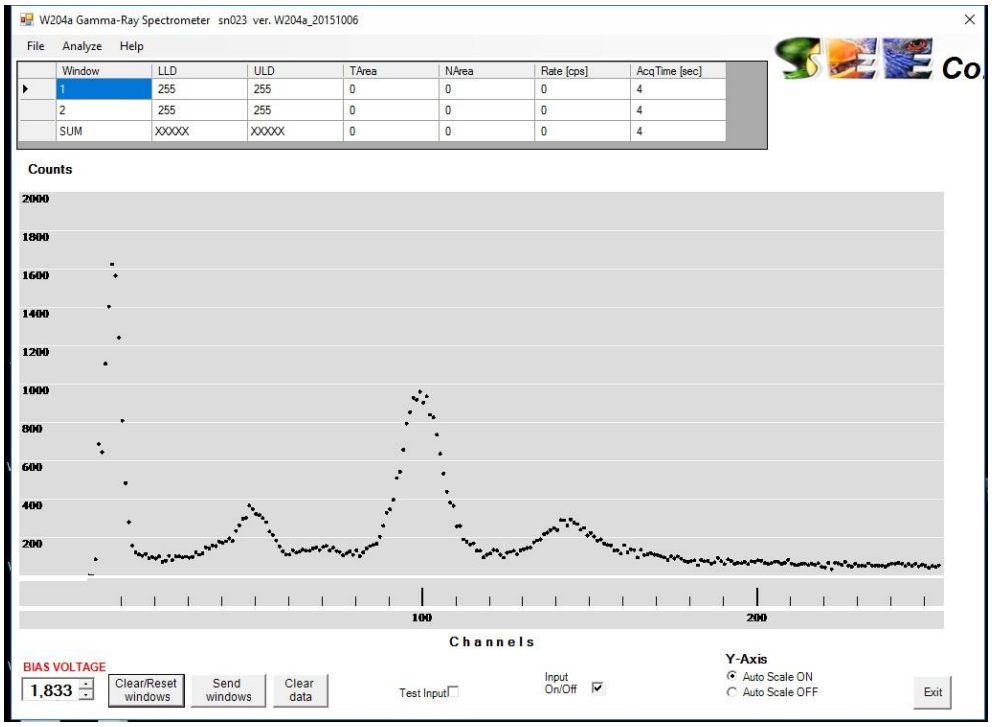
Variable Temperature Control:

Lake Shore Model 336 Temperature Controller

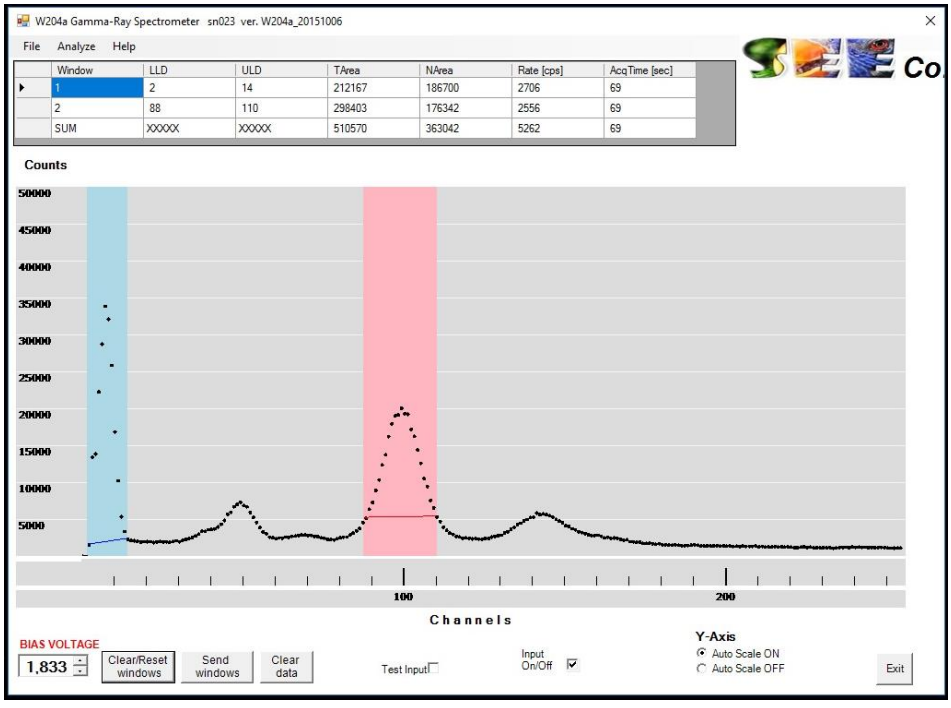
A shows cryostat cold head temperature and it has its own heater
B shows sample temperature and it has its own heater
Press “A” or “B” button first to change the setting of A or B. (*In the next 30s, if you don’t choose any button, it will return to the main status screen.)* Press “SETPOINT” button and choose your target temperature. Press “ENTER” to confirm. Press “Heater Range” to change the heater power. Please note: If cryostat cold head is very cold, even you turn on sample heater to maximum, it may still not reach your target temperature. You will need to find the best temperature/heater condition for the cold head (A) and your sample (B).

2. Data Acquisition

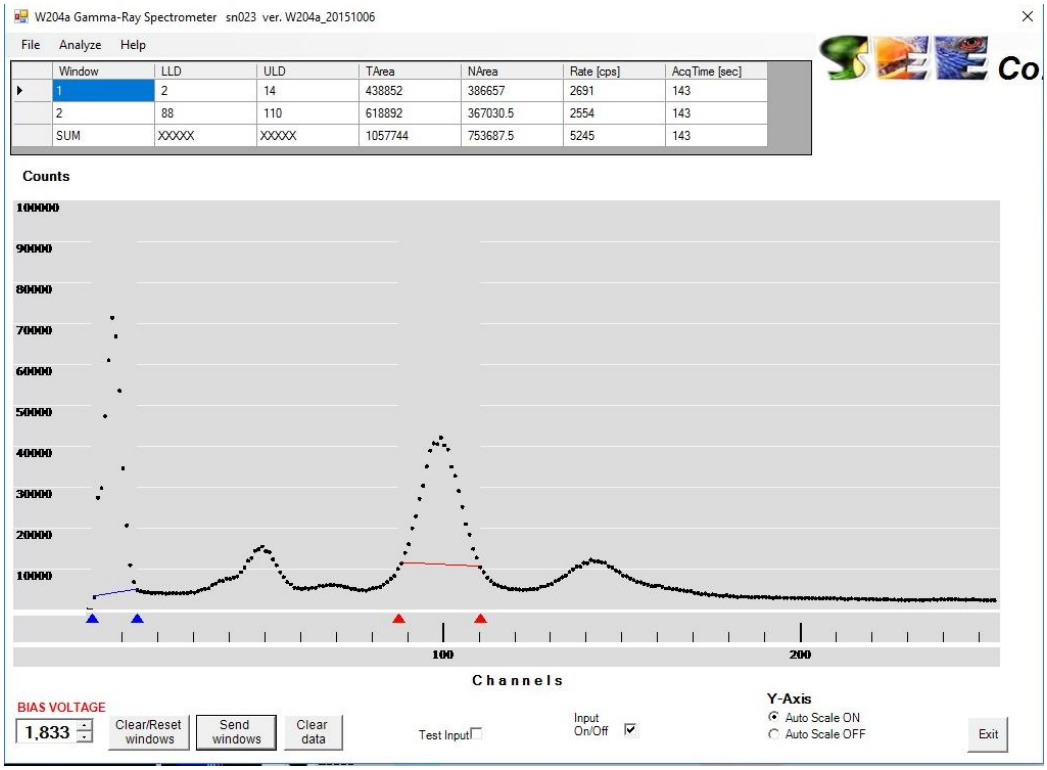
1) Open “W204a” software on Desktop. Click “OK” and click “Clear/Reset windows” button.



Drag and release mouse left click to choose gamma source windows

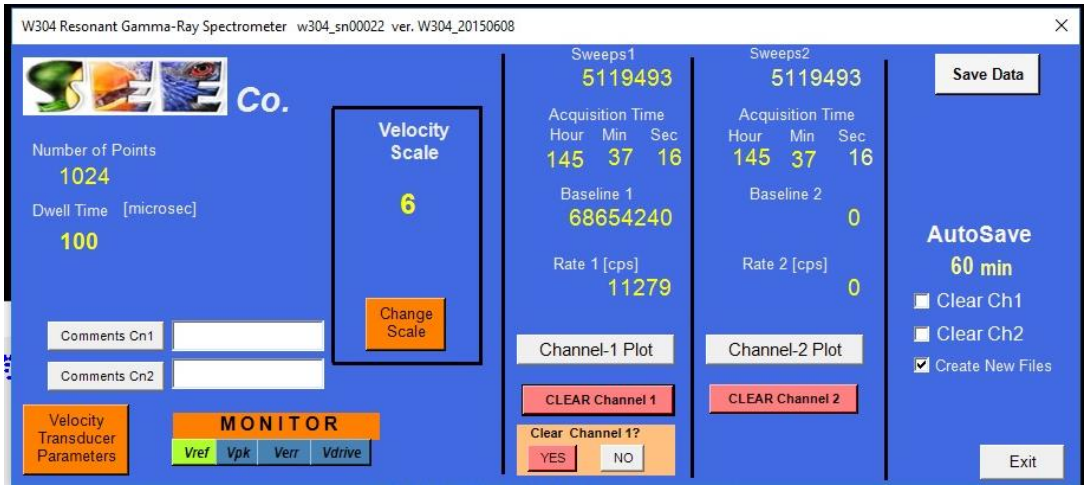


Click “Send windows”



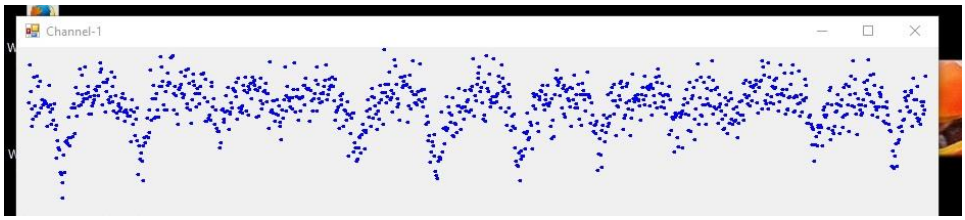
Click “Exit” button to close W204a

2) Open “W304” software on Desktop. Click “ClEAR Channel 1” button and then click “YES”. We don’t have channel 2.



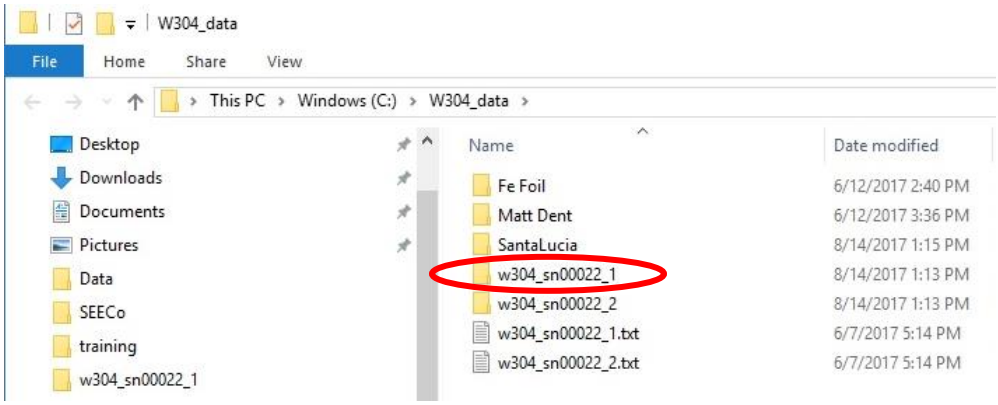
This will initialize data acquisition.

Change the “Velocity Scale” will change the radiation source motor motion. Higher number means more lines of spectrum. For example, Velocity Scale 6 means 4-line window. (VS 10 may mean 6-line window)



If no signal shows up after 10minutes and you know you have reasonable concentration of 57Fe, try to change the "Velocity Scale" back and forth to initialize the motor.

3) Usually you will need overnight acquisition for a good spectrum. The data is saved to following folder (red circled) every hour:



/Desktop/W304_data - Shortcut/w304_sn00022_1/

Or you can click "Save Data" button to manually save your data.

3. Data Processing

You will need to install WMOSS to process your Mossbauer data:
Software and manual can be downloaded:
http://www.wmoss.org/

Use Keyboard only in WMOSS. DON'T use number pad. DON'T minimize WMOSS window(or you will see black screen on the software).

If you want to use WMOSS in Mossbauer Spectrometer PC, the default data load file in located on /Desktop/Data - Shortcut/
Please copy your data into this fold to process.