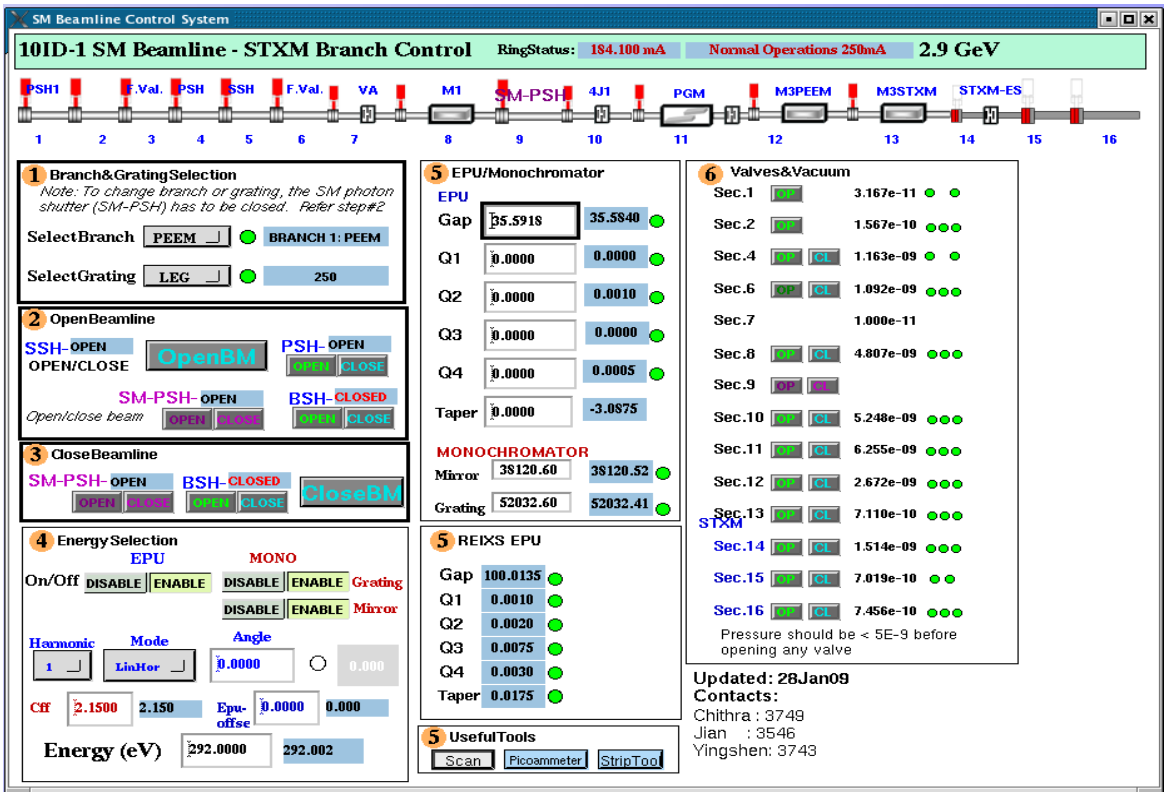
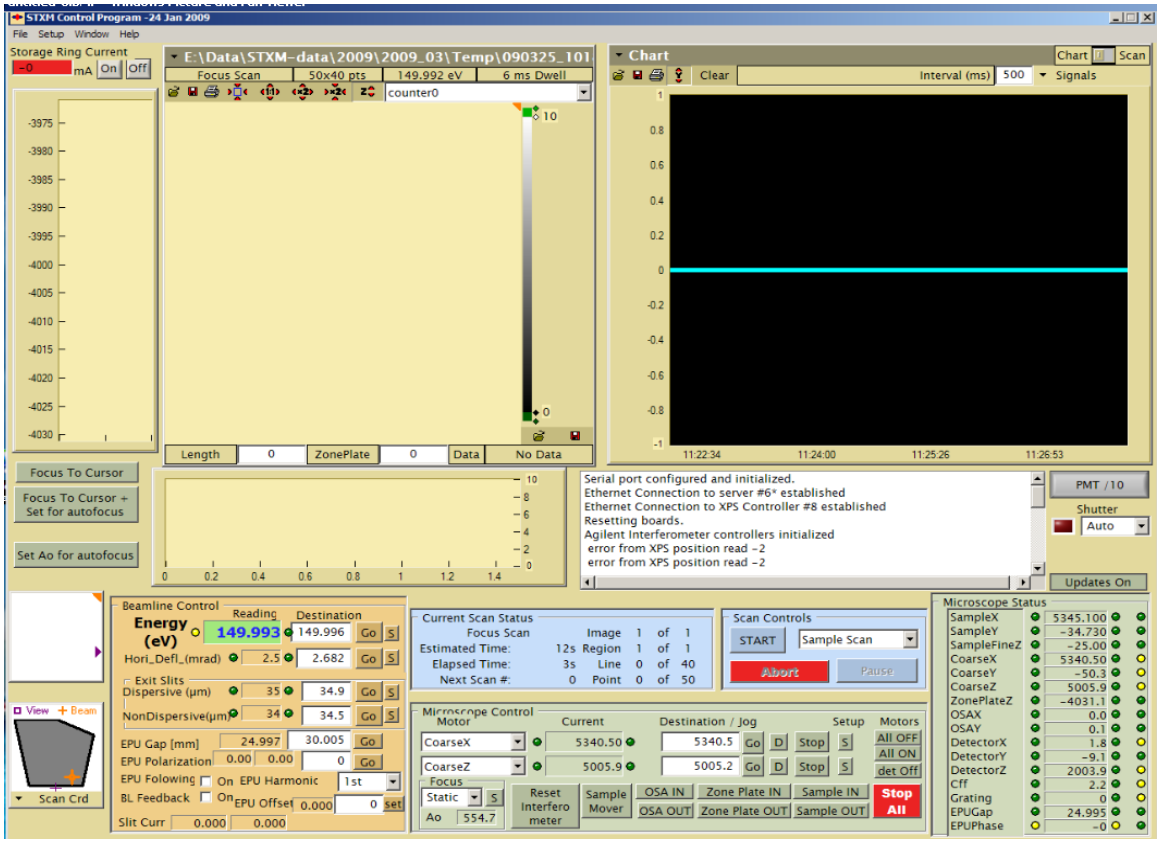
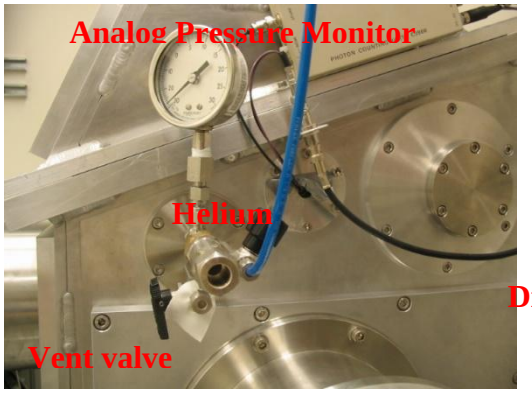
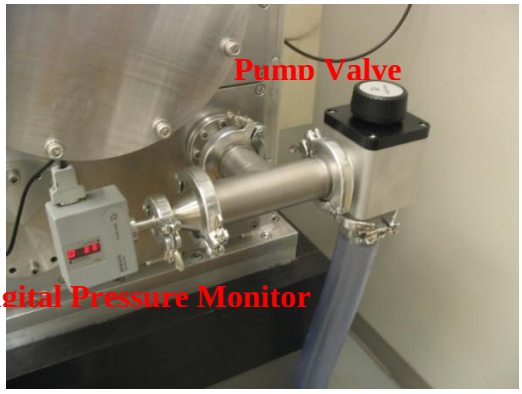
SM beamline control window



STXM control window







1. Getting started and Loading sample

1.1 Close SM-PSH and BSH – SM beamline control, if they are open.
1.2 Close pump valve and turn off pump, if they are open.
1.3 Open the vent valve on STXM tank to break the vacuum.
1.4 Turn off Detector.
1.5 Move coarseZ to 5000 um.
1.6 Open the STXM tank. Check there is no sample inside. If there is a sample, remove it by gently lifting it straight up. Be careful not to touch OSA or any other components inside STXM.
1.7 Load your sample. Write down the sample information, sample position and the empty hole position in own logbook.
1.8 Change ZP to static mode.
1.9 Select the right polarization (if your sample is not polarization sensitive, use Circular Right/Left), grating, harmonic number.

Energy Range (ev)	Grating	Harmonic	Polarization
<320 up to 390	LEG 250 l/mm	1st (use it for only C 1s & below)	LH, CR, CL
330 to 1000	MEG 500 l/mm	1st	LH, CR, CL
1000 to 1800	MEG 500 l/mm	3rd	Only LH
1800 to 2500	MEG 500 l/mm	5th	Only LH
>2200	HEG 1250 l/mm	5th or 7th (not well characterized)	Only LH

LH: Linear Horizontal; CR: Circular Right; CL: Circular Left

1.10 Change to the desired energy. Choose a proper A0 as recommended by the software (click the "S" above A0 line 

).
1.11 Set ZP to auto mode, and click 'Go' besides energy again.
1.12 Check the gap between ZP and OSA to make sure they do not touch each other.
1.13 Move Coarse Z to 3000 um.
1.14 Change energy to 395 ev with Harmonic = 1.
1.15 Close STXM tank.
1.16 Close vent valve.
1.17 Start pump and open pump valve slowly until it is completely open.

1.18 IF NOT A WET CELL, pump until Presure ~0.1 torr (~5 minutes), close the valve, and stop pump.

1.19 Backfill with He to 1/3rd atmosphere or 20inch.Hg in the analog gauge.

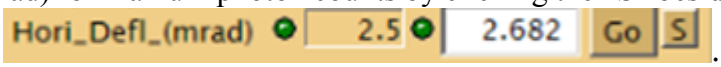
2. Optimizing signal and collecting data

2.1 Turn on Detector.

2.2 Open SM-PSH and BSH. Open SM-PSH and BSH – SM beamline control, if they are close). Note: after storage ring is refilled, one should manually open the safety shutter on ACIS panel and PSH - SM beamline control as well.

2.3 Move to an empty hole on sample holder by changing Coarse X and Coarse Y.

2.4 Open shutter and some level of counts should be observed.

2.5 Optimize the Hori_Defl_(mrad) for maxium photon counts by clicking the "S" besides "Go" and jogging by 1 unit 

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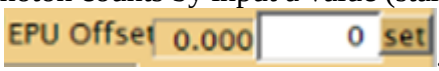
2.6 Optimize EPU offset for maximum photon counts by input a value (starting with 0) into the blank space besides the "set" 

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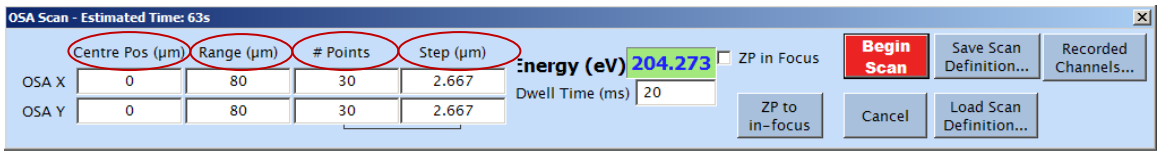
2.7 Adjust dispersive and non-dispersive slit size to have counts lower than 2×10^6 (PMT/10).

2.8 Table with recommended slit sizes :

	C 1s	N 1s	O 1s	Fe 2p
Dispersive	35	30	25	10
Non-Dispersive	35	30	25	10

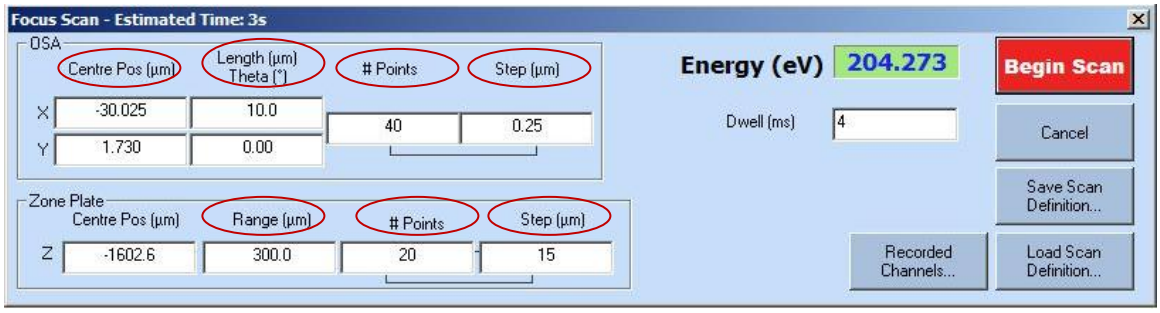
2.9 Close shutter to avoid unnecessary photo exposure to detector.

2.10 Perform an OSA scan to find OSA center, set OSA (0,0) to center of the ZP.



2.11 Perform an OSA focus scan and set the ZP scale.

2.12



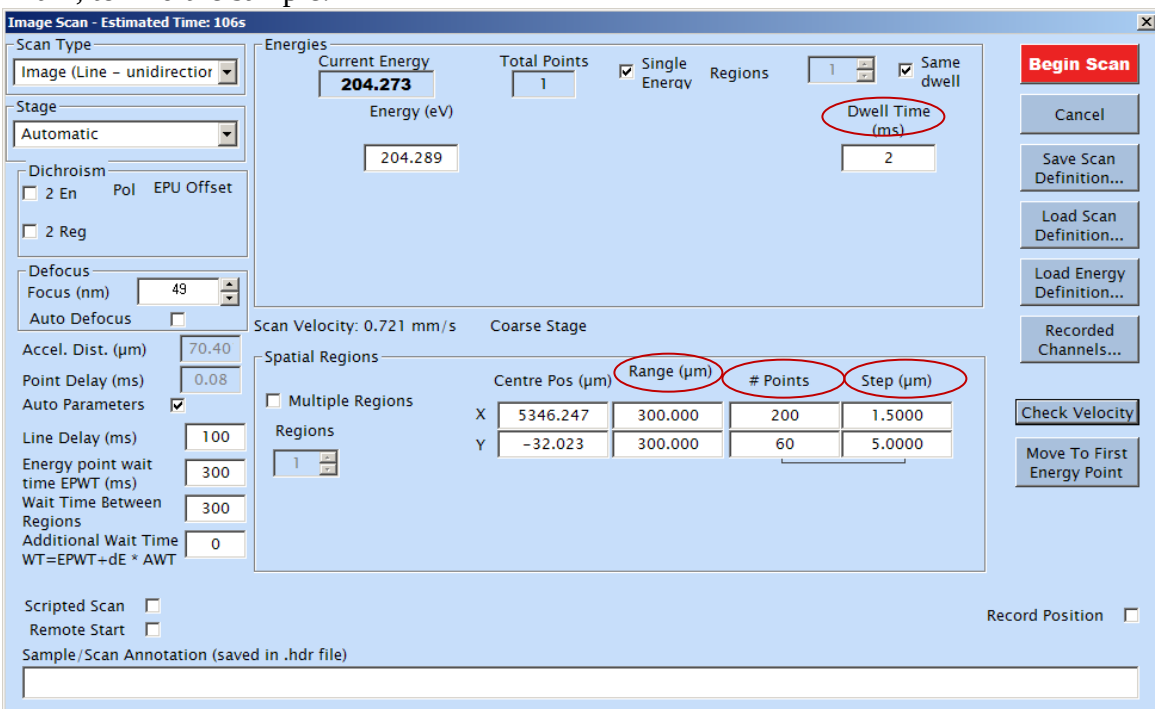
2.13 Move to your sample by changing coarse X and coarse Y.

2.14 Repeat steps 1.9, 1.10 and 1.11 to set the desired energy.

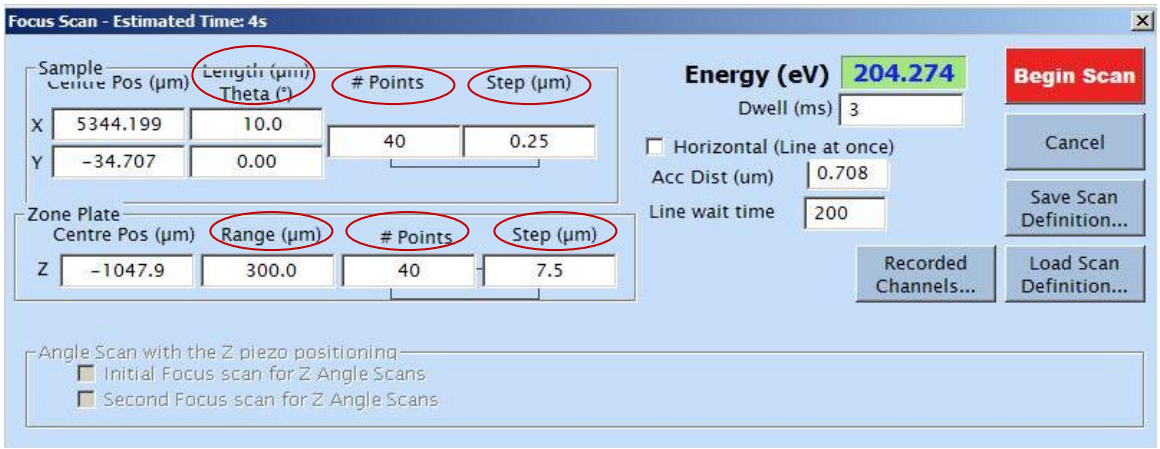
2.15 Move the coarse Z towards the expected position (Ao+sample thickness) CAUTIOUSLY while checking the sample does not make contact with the OSA. The following is the recommendation. Move first Coarse Z to the expected +300 um and after checking move to the desired position.

	C 1s			N 1s			O 1s		
		Sample coarse Z			Sample coarse Z			Sample coarse Z	
	A0	grids	200 um window	A0	grids	200 um window	A0	grids	200 um window
25 nm ZP	320	450	600	400	530	680	500	630	780

2.16 Perform a sample scan with a big scan range (coarse scan), for example 300 um × 300 um, to find the sample.



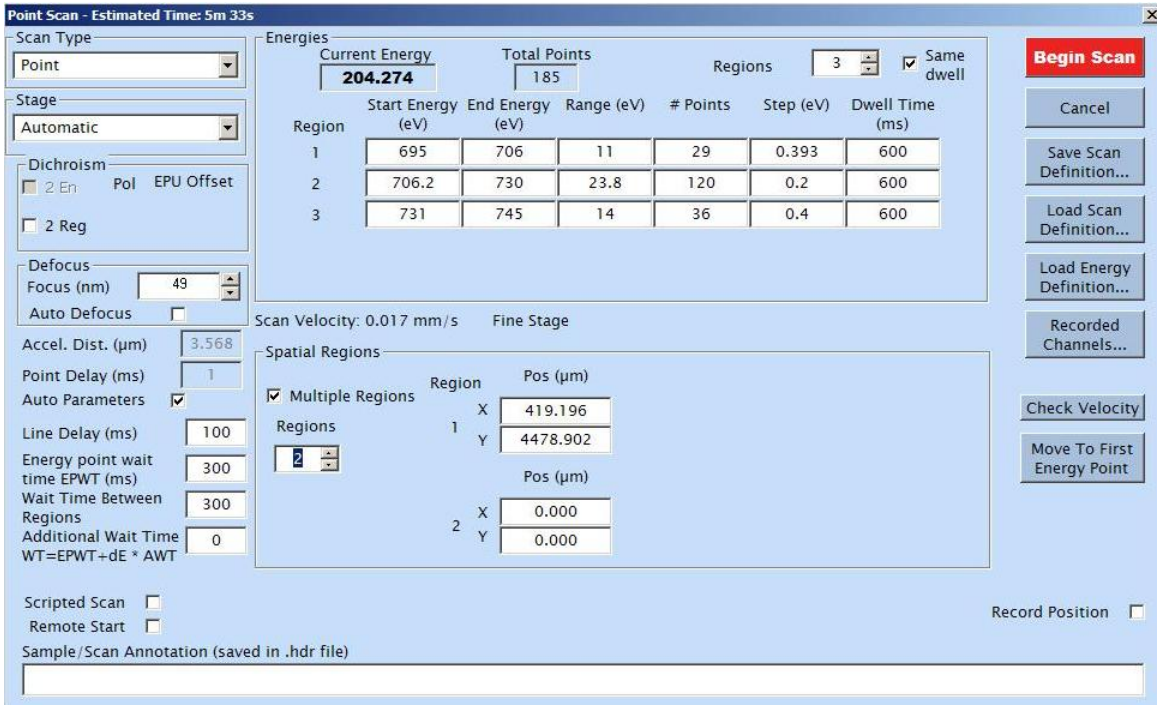
2.17 Choose a sample region or an object with good white/black contrast. Perform a focus scan with the line drawn on this region to cover sufficient white/black contrast. The ZP scan range can't be too big, usually smaller than 300 µm, otherwise ZP might hit OSA. After focus scan, select the focal point or most close to the focal point region, set 'Focus to cursor + set for autofocus'.



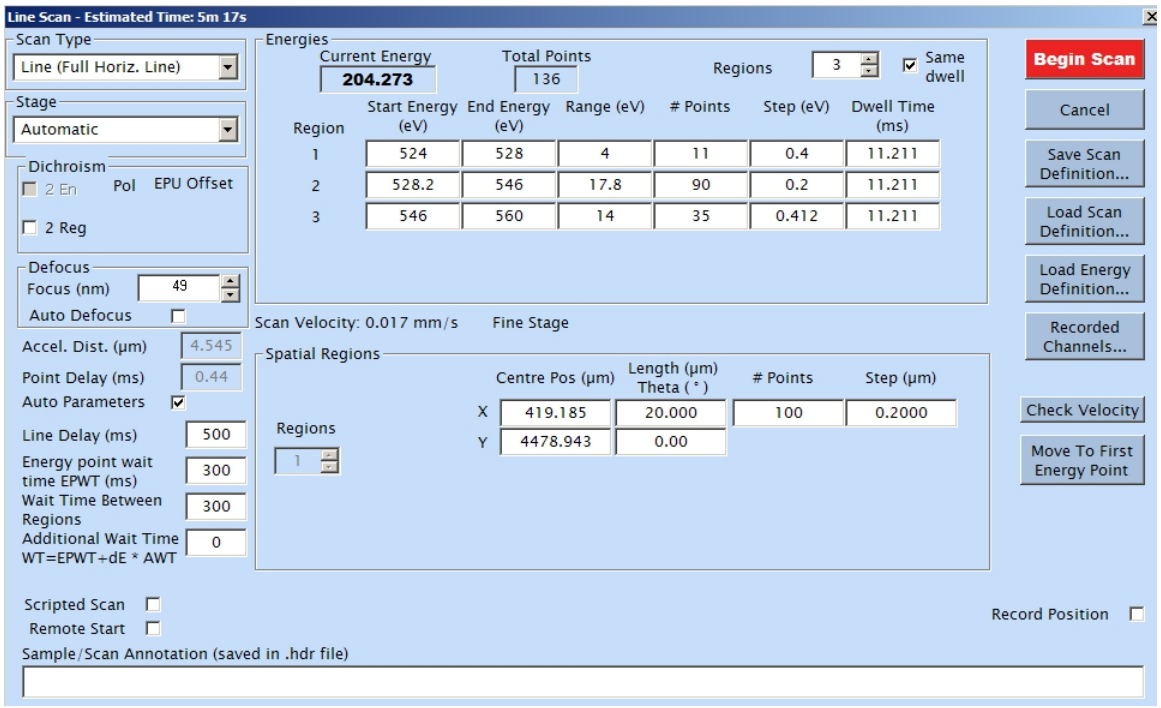
2.18 When an interested small area is chosen, focus scan should be performed again. If the scan range is within 30 um, use 'set Ao for focus'.

2.19 Perform necessary point scan, line scan, or image scan.

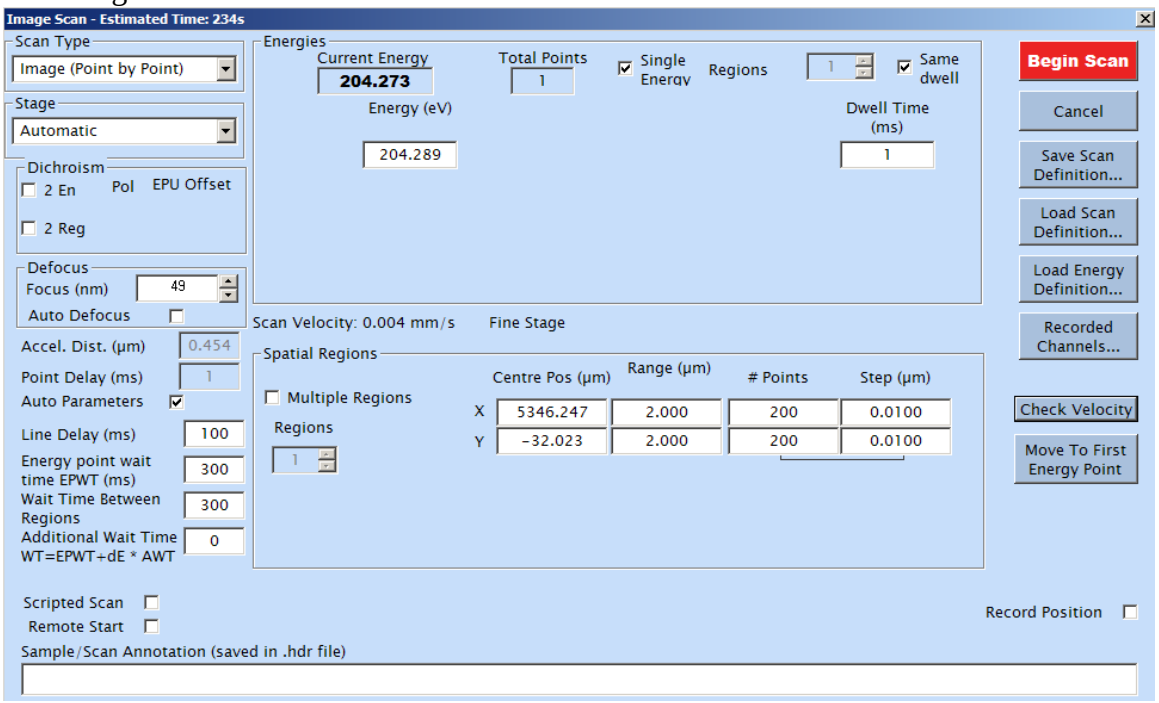
Point scan:



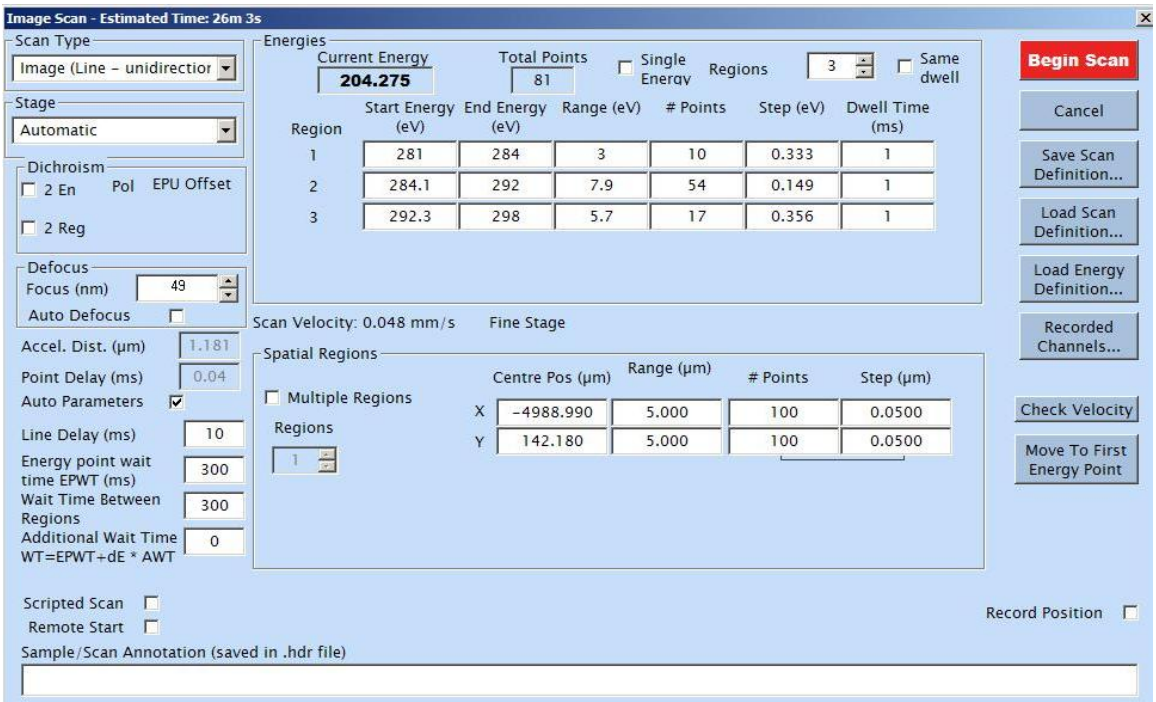
Line scan:



Fine image:



Stack:



3. Moving between samples on the same sample holder

3.1. Write down the current Coarse Z reading (for example, 400 um).
3.2. Move Coarse Z by 1000 um from the current position (400 +1000 = 1400 um).
3.3. Move to your next sample by changing coarse X and coarse Y.
3.4. If you are going to use the same energy, move coarse Z to 500 um (400 + 100 = 500 um). If you are going to use a different energy, refer to step 4.
3.5. Repeat steps from 2.12 to 2.15.

4. Change to a different energy

4.1 Write down the current coarse Z reading (for example, 400 um).
4.2 Write down the current A0 reading (for example, 390 um).
4.3 Change ZP to static mode.
4.4 Select the right polarization (if your sample is not polarization sensitive, use Circular Right/Left), grating, harmonic number.

Energy Range (ev)	Grating	Harmonic	Polarization
<320 up to 390	LEG 250 l/mm	1st (use it for only C 1s & below)	LH, CR, CL
330 to 1000	MEG 500 l/mm	1st	LH, CR, CL
1000 to 1800	MEG 500 l/mm	3rd	Only LH
1800 to 2500	MEG 500 l/mm	5th	Only LH
>2200	HEG 1250 l/mm	5th or 7th (not well characterized)	Only LH

4.5 Change to the desired energy. Choose a proper A0 (for example, 690 um) as recommended by the software (click the "S" above A0 line 

).
4.6 Calculate the difference of the two A0 (Δ: 690 um – 390 um = 300 um).
4.7 Move coarse Z to the position of the current reading plus the difference of A0 (in this case, the new position is 700 um = 400 um + 300 um).
4.8 Set ZP to auto mode, and click 'Go' besides energy again.
4.9 Repeat steps from 2.12 to 2.15.

5. Unloading Sample

5.1 Close SM-PSH and BSH – SM beamline control.
5.2 Move coarse Z to 5000 um.
5.3 Detector off.
5.4 Pump valve closed and pump off and (if you were pumping).
5.5 Vent the STXM tank.
5.6 Remove top flange to access sample.
5.7 Take sample out, being careful NOT to touch the OSA – lift straight up.
5.8 If no more sample to run during the shift, click 'Close BM'.
5.9 Pump STXM tank and fill with He if it is the end of your beam time and there is no user after you (if instructed by the beamline staff).