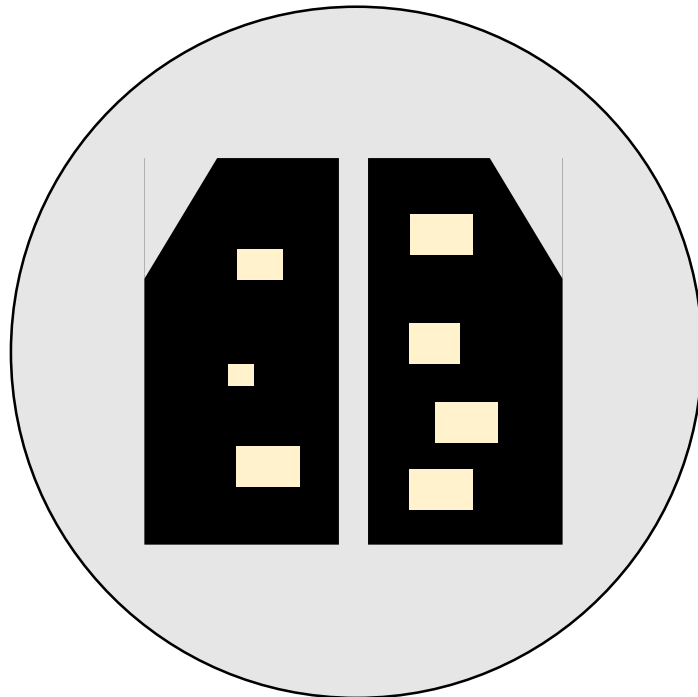


# Ultra-55

Zeiss Ultra-55 Field Emission Scanning Electron  
Microscope (FESEM)

CNS Harvard

- Prepare your samples in a puck and mark the tape by cutting one corner.
- Make a map of your samples
- Give a description of which elements you expect to find in each sample.



1. Open the web browser
2. Click on CNS CLEAN
3. Select Ultra55 from Room B15 i
4. User type → User

5. Select “Have Reservation”
6. Choose your name
7. Enter password (cns2tafti)
8. Login

Harvard University  
Center for Nanoscale Systems

Official CLEAN Time\*: 2:31:13 PM (Thurs)  
\* This is the official time of record CNS will use for billing purposes. Please ignore the local computer time.

SEM-4 - FESEM Ultra55

**Tool Authorization:** To enable this system, please select your use type (User/Staff/Assisted Use), then enter your password. Billing will commence after successful authentication. You may log in now without a reservation, and a reservation will be created for you. If you would like to consult the full scheduler first, [you may access it here.](#)

User ▼ Tafti, Fazel ▼ Have Reservation ▼ (for Walk-up Reservation)  
 \*\*\*\*\* <- enter your password.  
 login

ID and PW are the same for the CNS login and the SMART-SEM software:  
 ID: ftafti  
 PW: cns2tafti  
 Images are saved in the folder ftafti on the Z-drive

This tool is currently not in use.

Document Repository for SEM-4  
 SOP: [SOP055 Ultra55, Ultra Plus and Svora FESEM](#)      SOP: [SOP078 Using the Ultra 55, Ultra Plus and Svora FESEMs](#)

**Up Coming (and Current) Reservations**

Start Date and Time	End Date and Time	User	Staff	Notes
2018-05-03 14:00	2018-05-03 16:00	Fazel Tafti		Reservation made by Tim Cavanaugh.
2018-05-03 16:00	2018-05-03 16:30	Benjamin Zhang		
2018-05-03 17:00	2018-05-03 18:00	Iyo Stassen		
2018-05-03 18:00	2018-05-03 22:00	Henry Tsang CHEM165SP18		
2018-05-04 09:30	2018-05-04 10:30	Alexander Raymond		

**System Log for Past Sessions** since Mon, Jan 1, 2018  
 Click on (edit) to Edit a Comment.  
 Display logsheet

Before starting EDX, make sure the detector is in the correct position and before removing samples, make sure the detector is in the safe position

Place the puck in the holder and tighten the screw

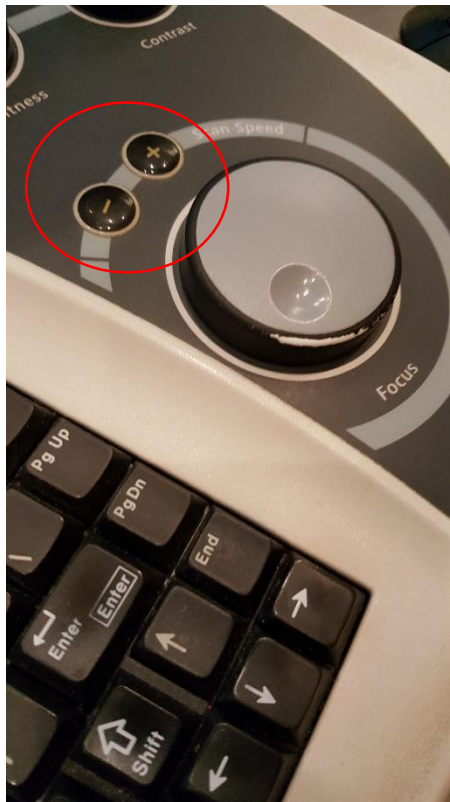


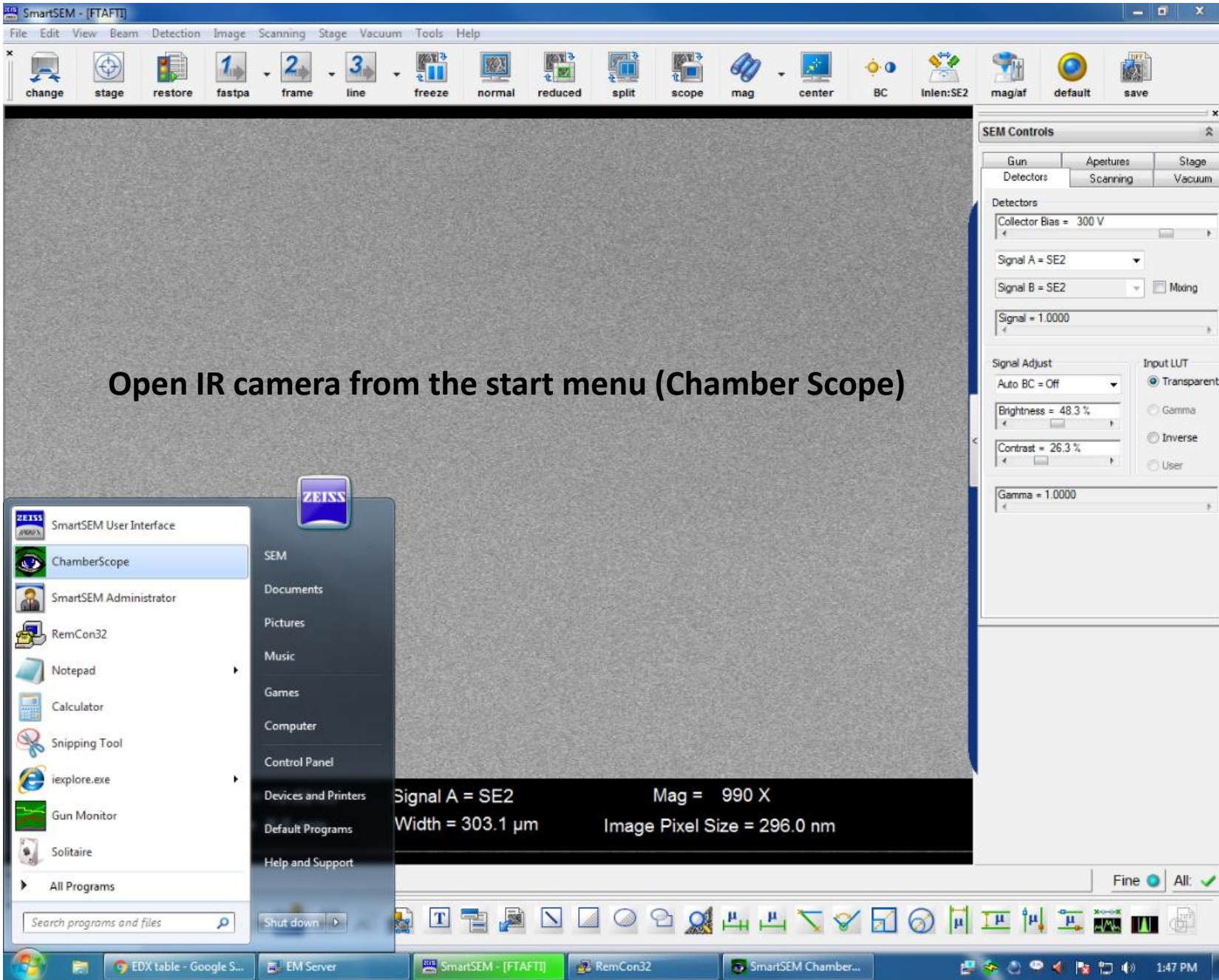
Magnification knob

XY-stick

Z-stick

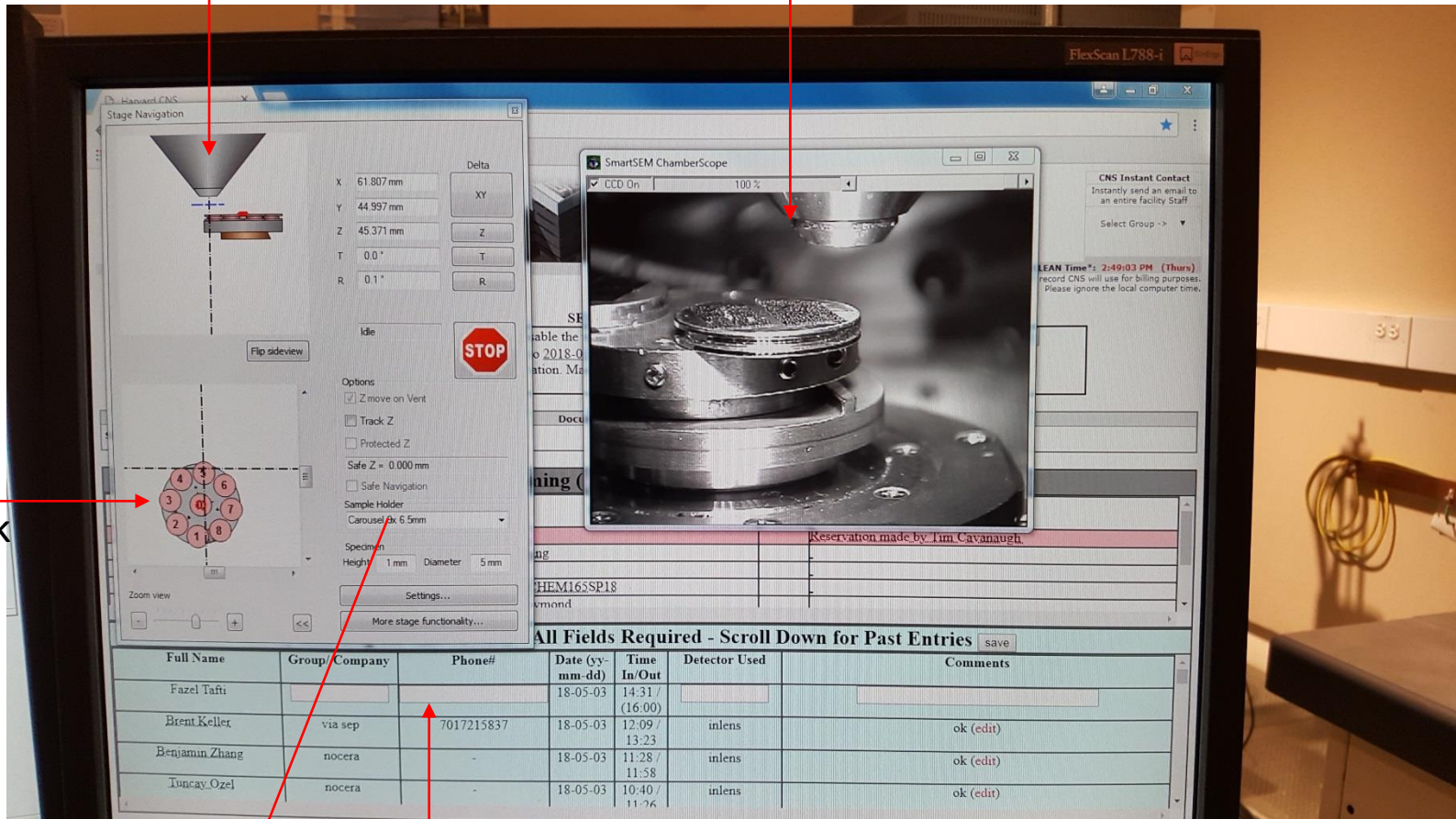
+/- increase/decrease scanning rates.  
Typically, you need slower scans to  
clarify backscattered images.





From top menu, select Stage\Navigation  
Adjust a safe Z-height

IR camera  
(Chamber Scope)



Double click  
to select puck

Sample Holder

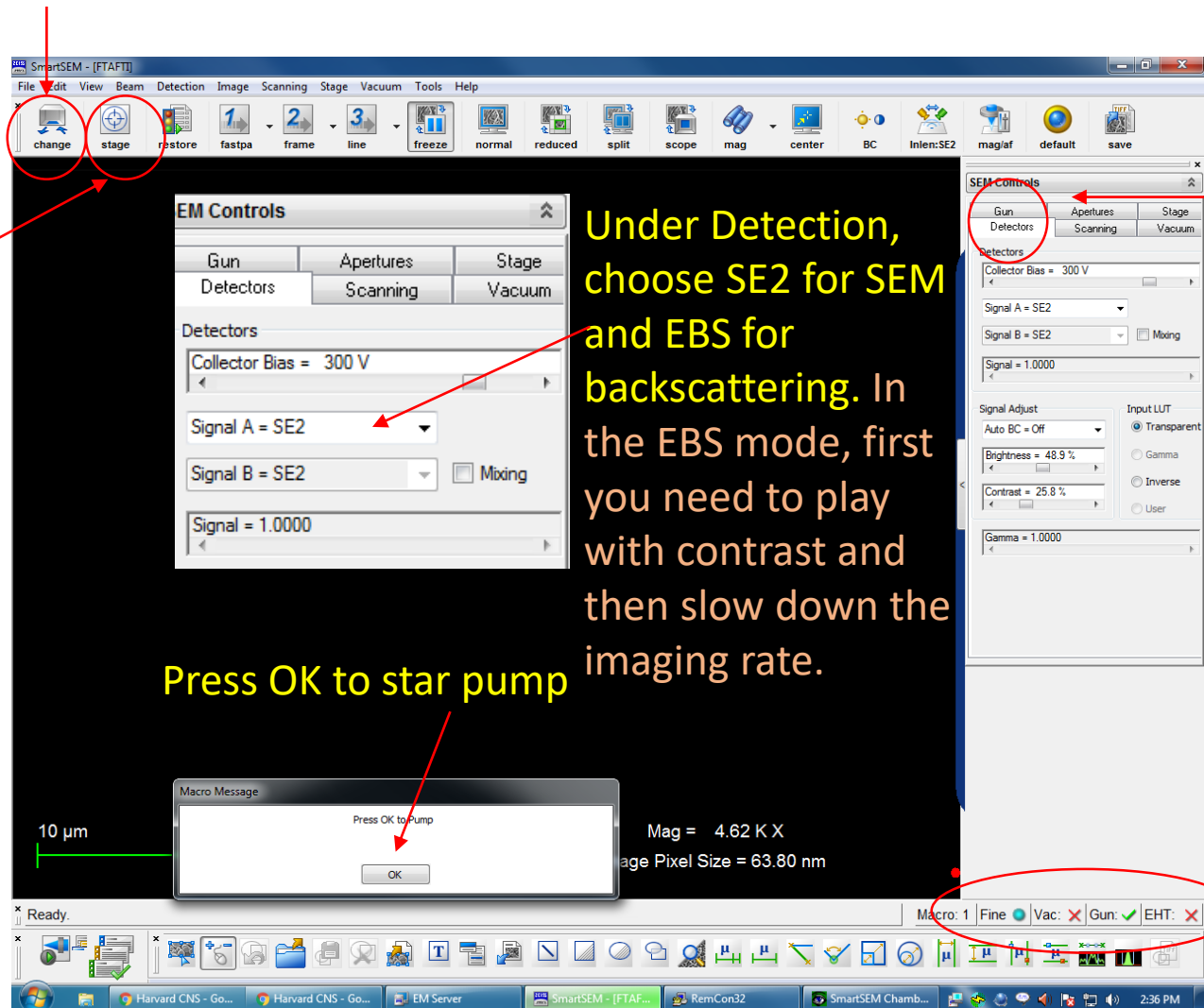
Carousel 9x 6.5mm

At the end of the experiment, you need to insert the information here, enter your PW, and log out by re-entering your password

1. Double click on “smart sem”
2. Input ID and PW (ftafti, cns2tafti)
3. Fix samples on the puck
4. Click on “Change” to vents the chamber

5. Press “OK” to start pumping
6. Wait until “vac” is green
7. Press “EHT” and select “EHT on” to start high tension

Initializes stage position to remove the sample puck



Under Detection, choose SE2 for SEM and EBS for backscattering. In the EBS mode, first you need to play with contrast and then slow down the imaging rate.

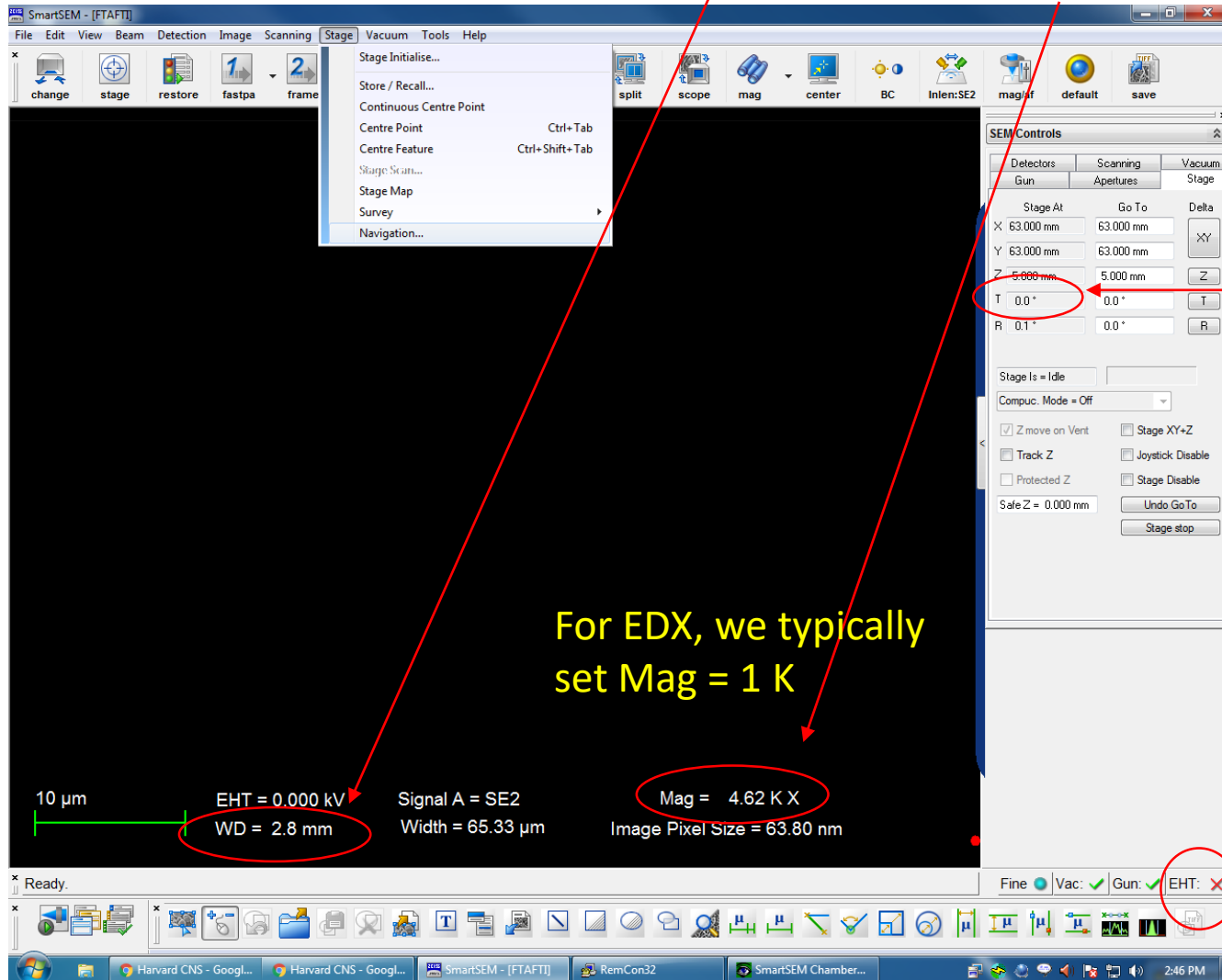
Press OK to star pump

Check the Gun and Detection status here

Macro: 1 Fine Vac: X Gun: ✓ EHT: X



1. On top bar, select “stage” → “Navigation”
2. Double click on the stage number
3. Use the Z-stick to bring the stage up while monitoring with the IR camera
4. Be careful not to exceed the safe Z limit
5. Double click on “WD” and put it to 8.5, then hit enter
6. Use the Z-stick to bring the stage to focus
7. Double click on “Mag” to adjust



**Make sure there is no tilt**

**For EDX, we typically set Mag = 1 K**

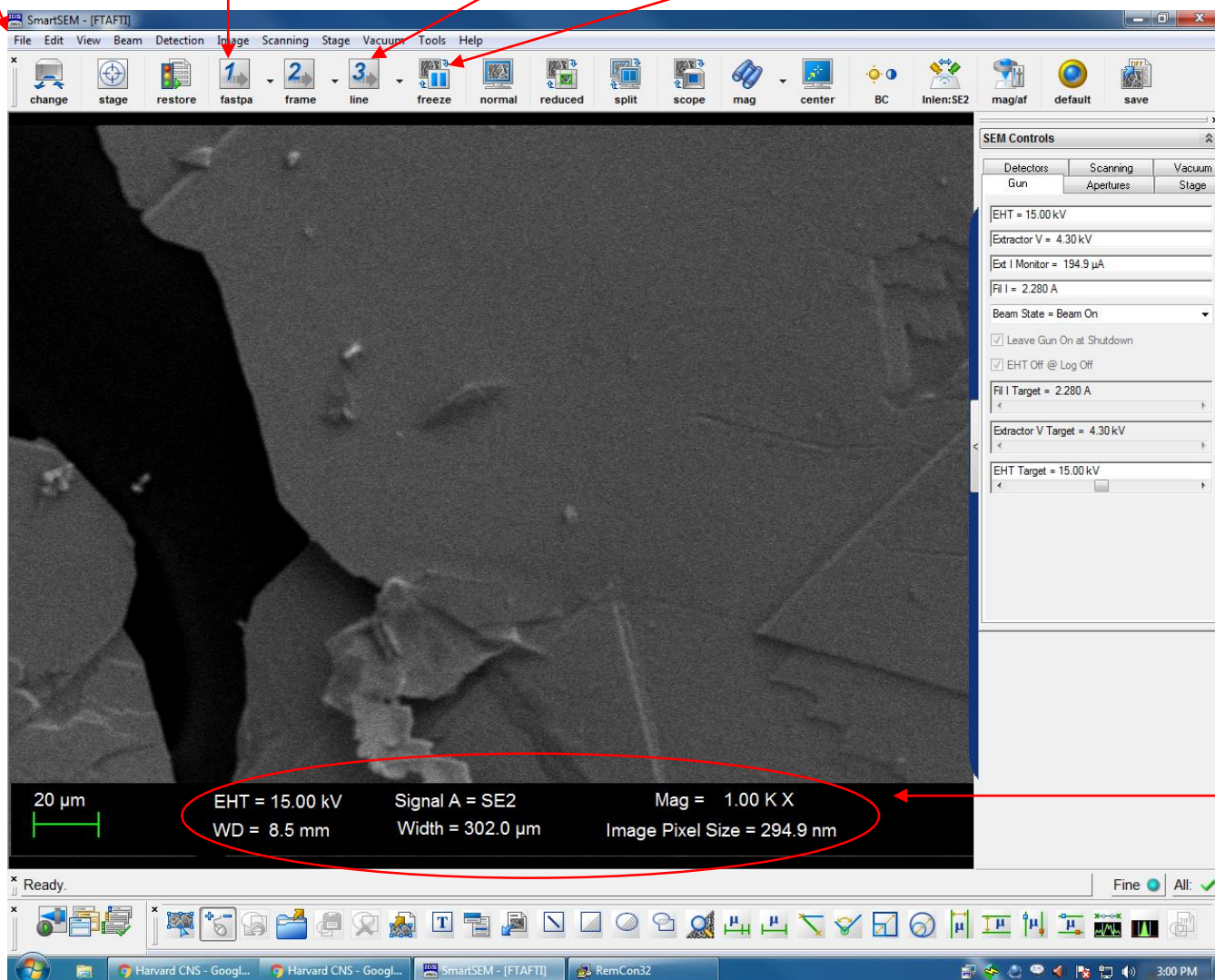
**Turn on EHT**

To save image, File → save image → choose directory and save

“fastpa” is good  
for scanning

“line” is good  
to take image

Make sure the  
image is not frozen



Typical  
parameters  
used for  
EDX analysis

To start EDX, put the detector in the correct position → **turn off ccd** (make sure the checkbox is off, no need to close the window) → double click on “EDX-Genesis”

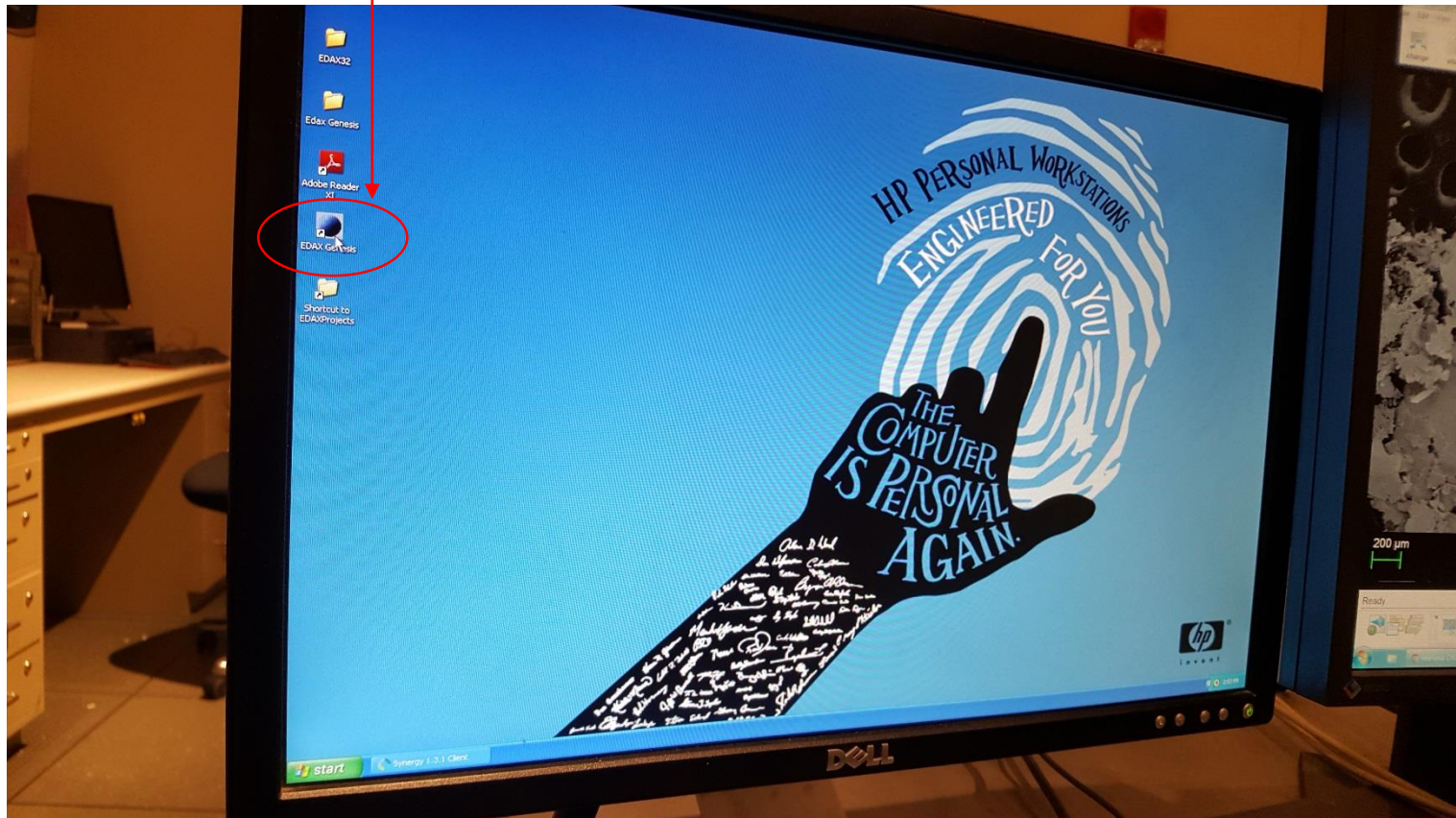
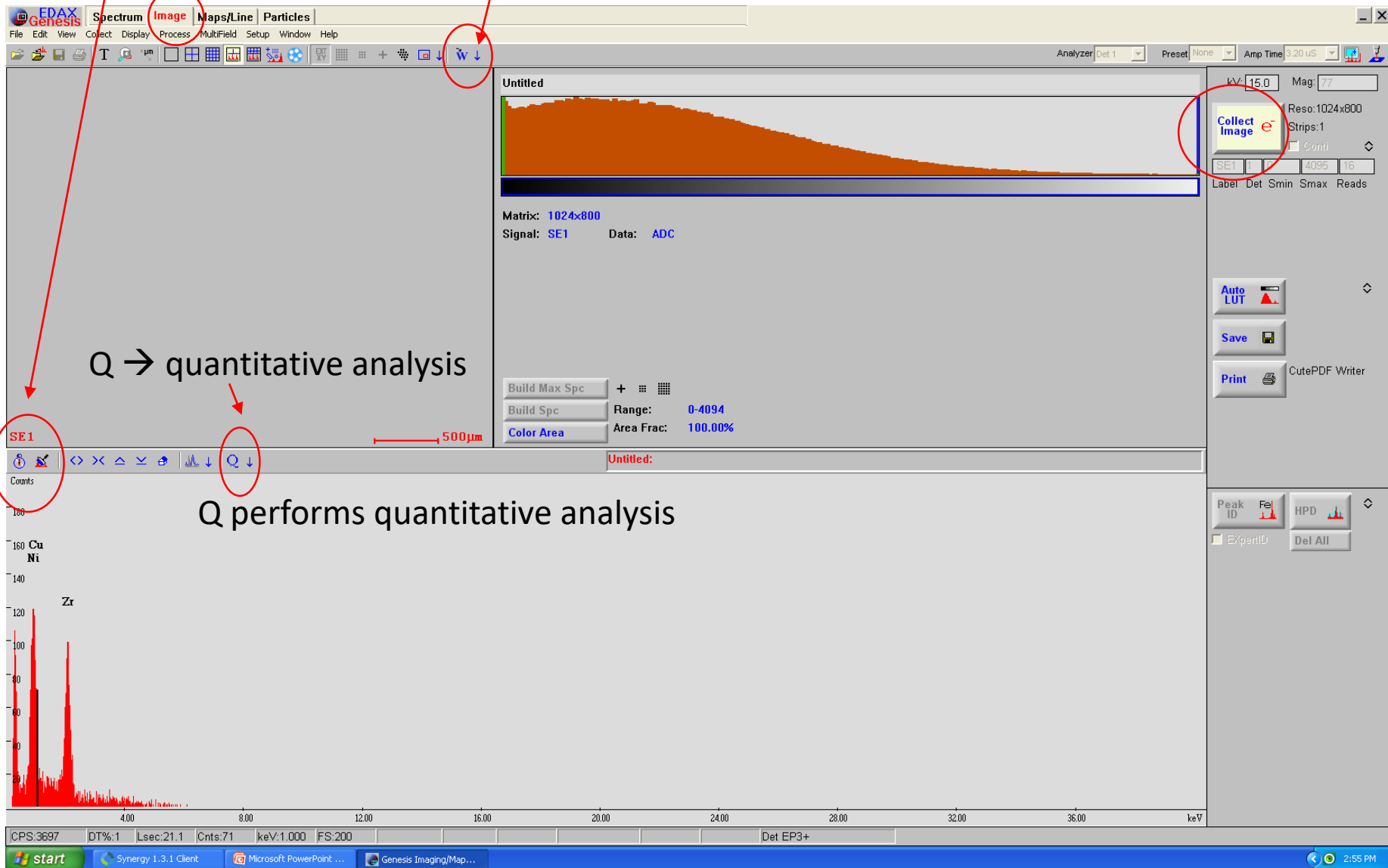


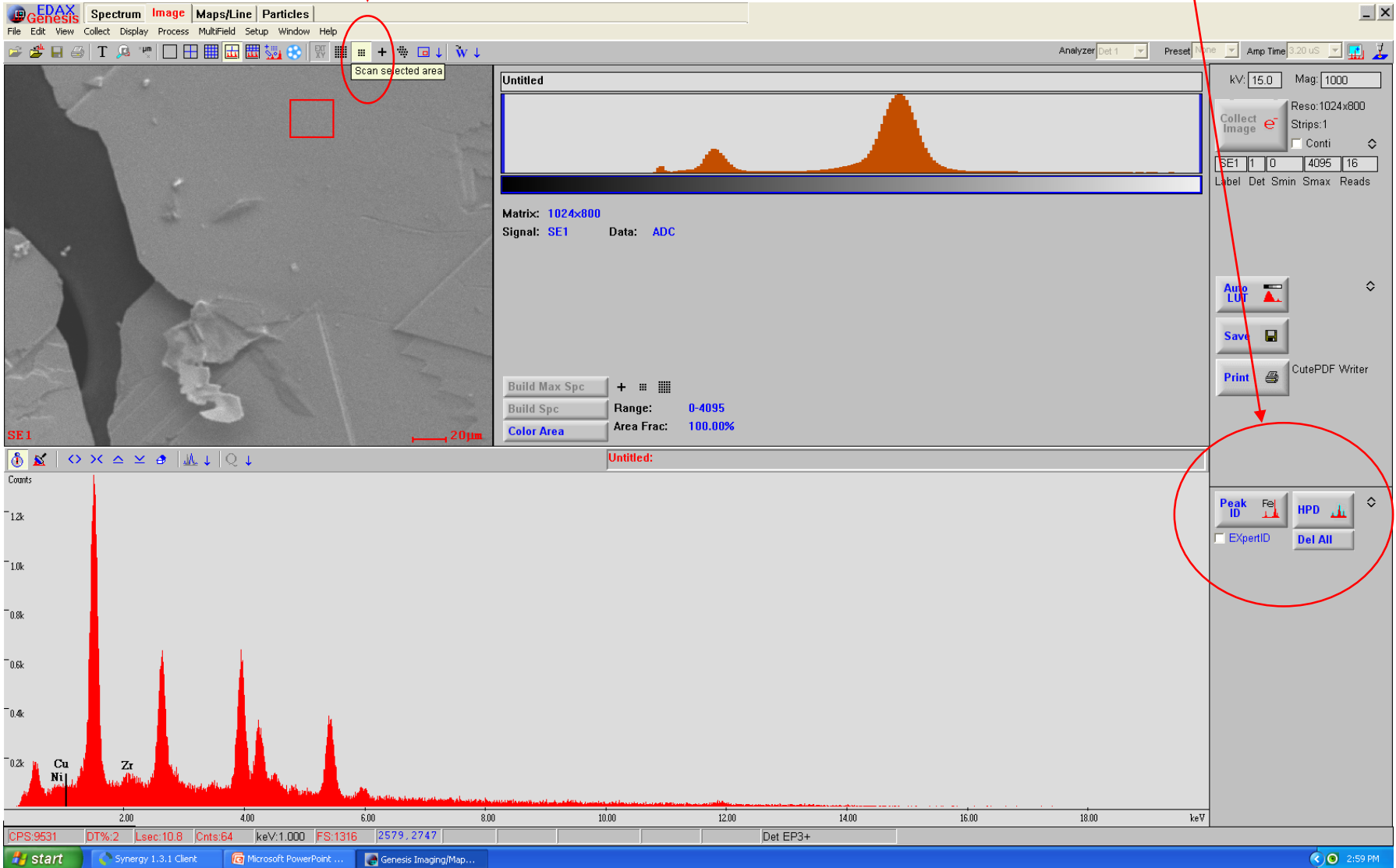
Image tab → collect e image → select region → red icon cleans the existing spectrum and stopwatch collects new spectrum

W generates words report



Select area for scanning

Peak ID → click on the drop-down icon and select element, you may need to delete O or Al or C for better quantitative results, Pt and Pd coating always appear

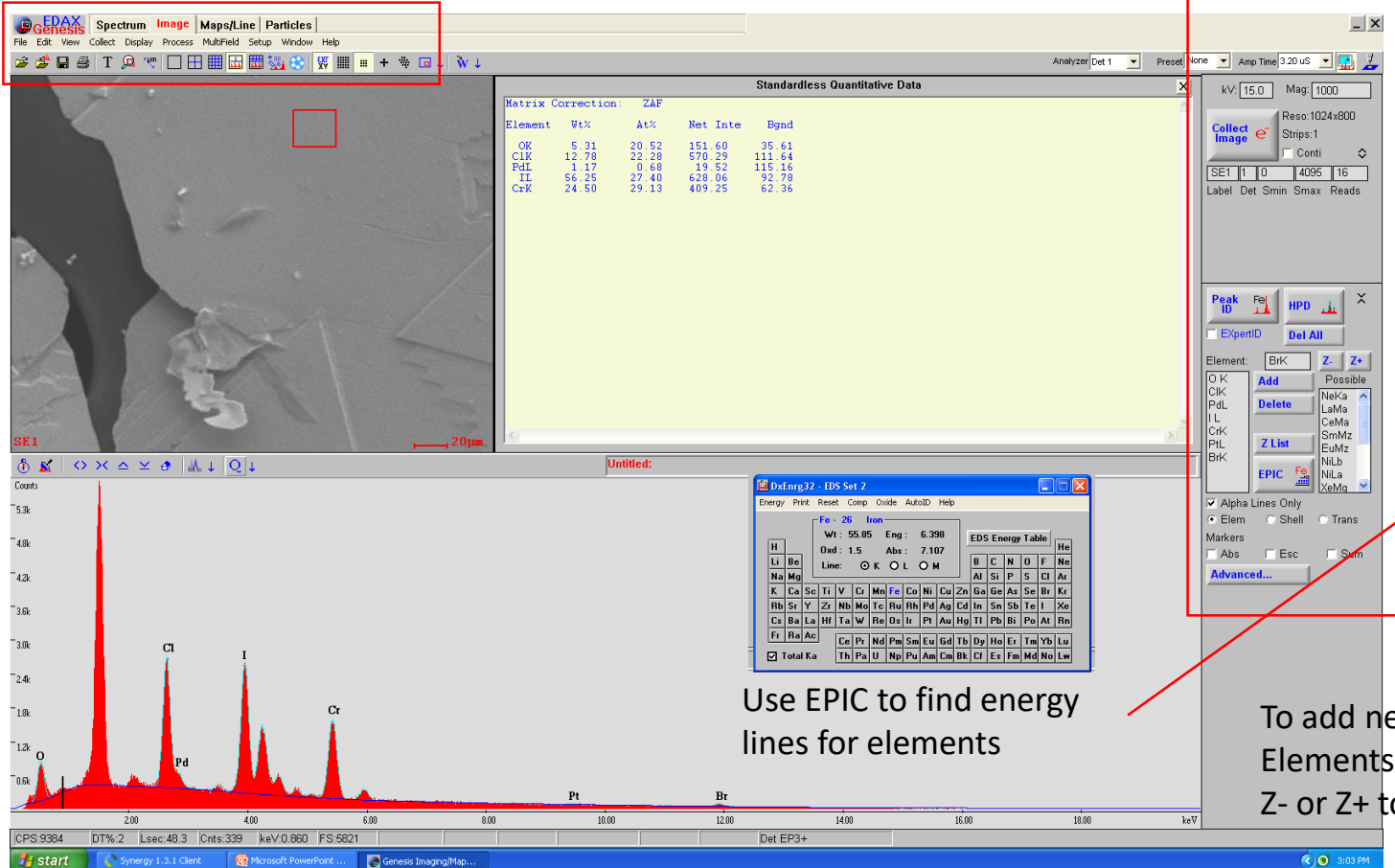
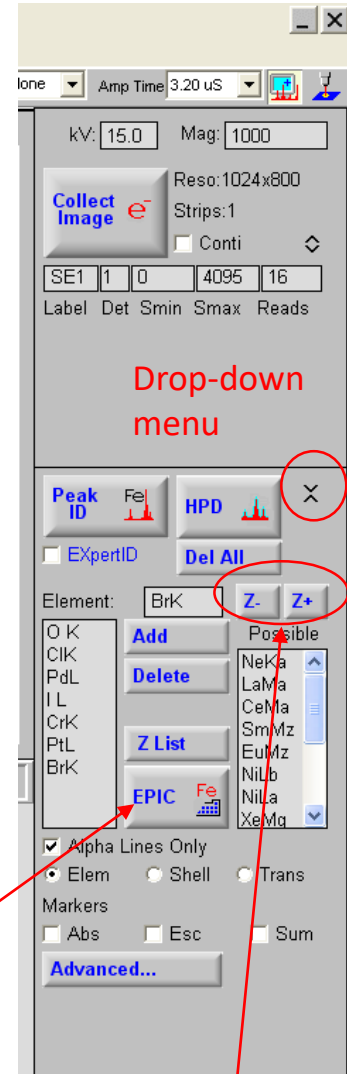
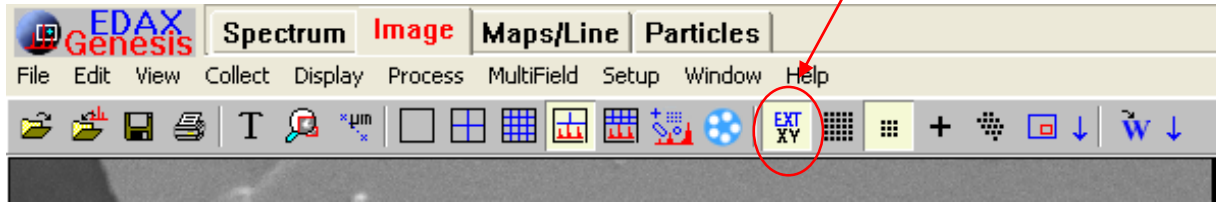


For regular EDX

For elemental mapping

Click after each EDX analysis to release the image

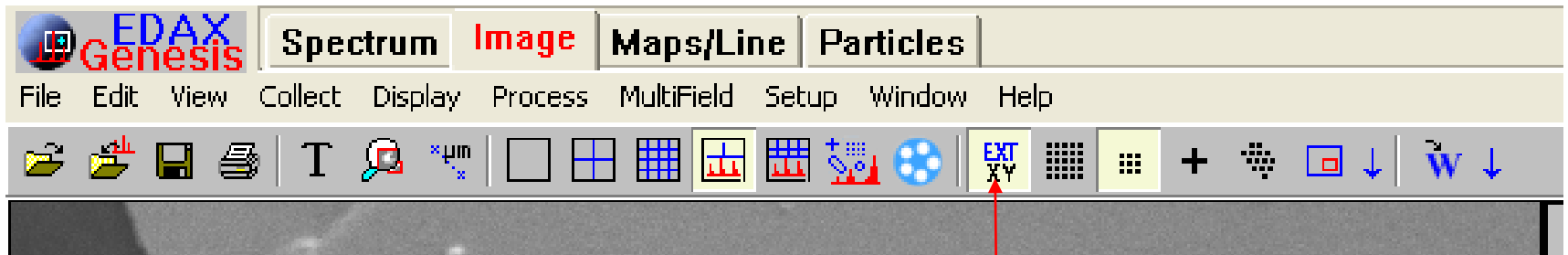
To adjust background manually



Use EPIC to find energy lines for elements

To add new elements, pick one of the Elements in the left column and use Z- or Z+ to reach other elements

- To save spectrum data → Go to spectrum tab → File → Import SCP from → Image/Maps
- Then, Save → save as case.csv



After each analysis and saving data, unfreeze the microscope by pressing on “EXT-XY”

For elemental maps → select maps/line tab → press “collect e” → collect maps → save the maps in a proper directory

The screenshot displays the EDAX Genesis software interface. The top menu bar includes 'Spectrum', 'Image', 'Maps/Line', and 'Particles'. The 'Maps/Line' tab is selected. The main window is divided into several sections:

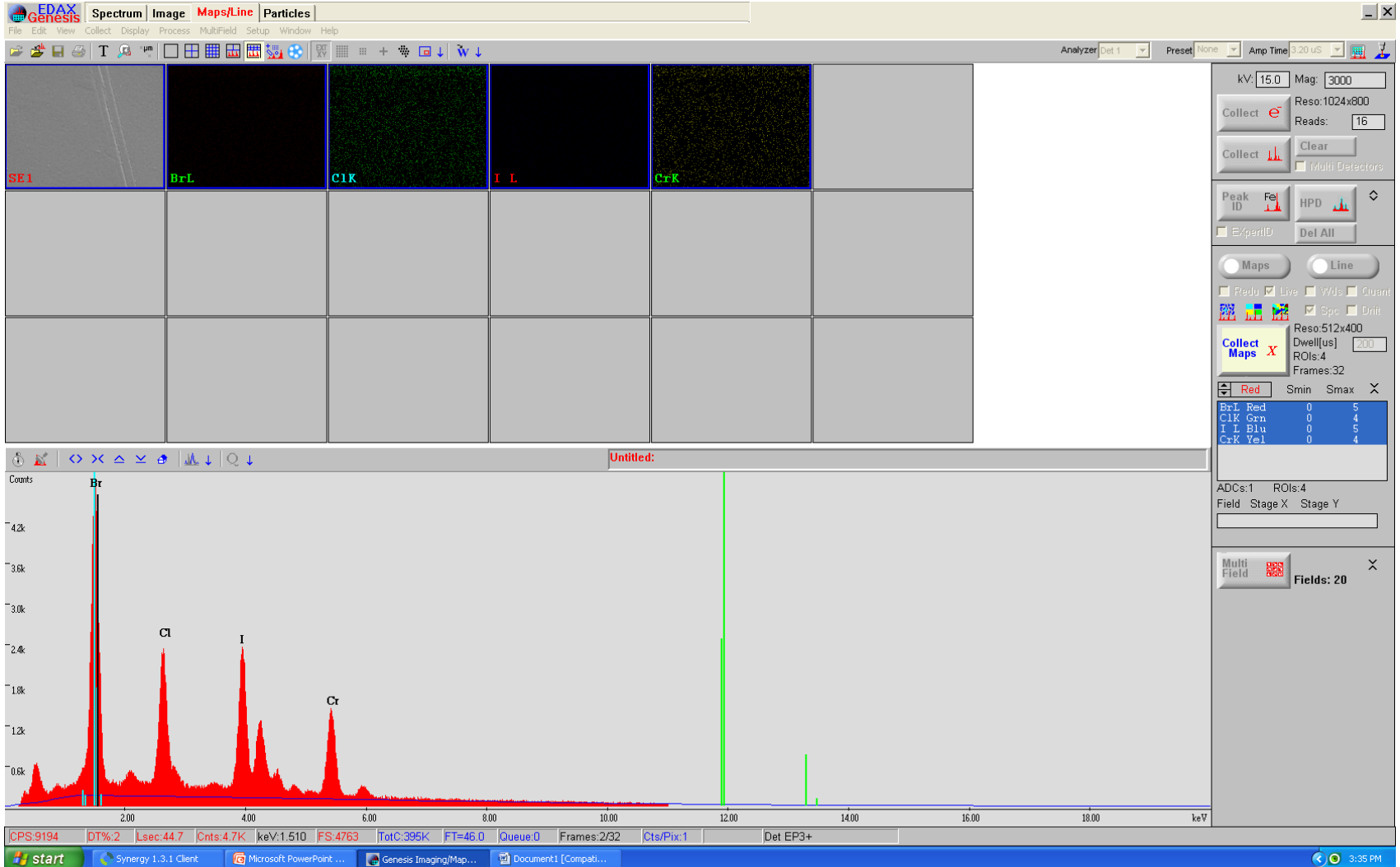
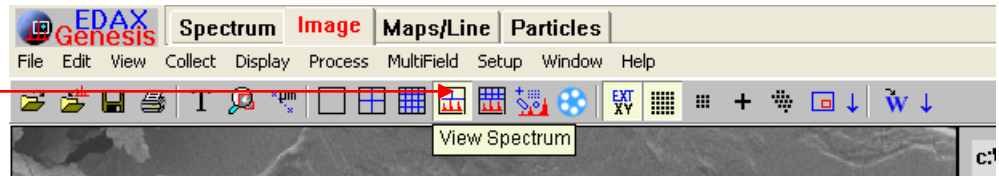
- SE1 Image:** A grayscale image of a sample surface with a red rectangular box highlighting a region of interest. A scale bar indicates 10 μm.
- Standardless Quantitative Data Table:** A table showing the results of a ZAF matrix correction. The data is as follows:

Element	Wt%	At%	Net Inte	Bgnd
BrL	31.66	28.81	747.17	52.46
ClK	10.09	20.69	419.78	50.33
IL	37.54	21.51	420.60	49.70
CrK	20.72	28.99	363.28	43.44
- Control Panel (Right):** Contains various buttons and settings. The 'Collect e' button is circled in red. Below it, the 'Collect Maps' button is also circled in red. Other buttons include 'Peak ID', 'HPD', 'ExpertID', 'Del All', 'Maps', 'Line', 'Redu', 'Live', 'Wds', 'Quant', 'Spc', 'Drift', 'Auto LUT', 'Print', and 'Multi Field'. Settings for kV (15.0), Mag (3000), Reso (1024x600), Reads (16), Dwell (200), and Frames (32) are visible.
- Spectrum (Bottom):** A plot of Counts vs. Energy (keV) showing peaks for Br, Cl, I, and Cr. The y-axis ranges from 0.3k to 2.7k counts, and the x-axis ranges from 0 to 18 keV.
- Status Bar (Bottom):** Displays technical parameters: CPS:9426, DT%:2, Lsec:41.4, Cnts:2.8K, keV:1.510, FS:2913, 2559, 1773, Disk:, Time:25.6min, Det EP3+.



Color of each element can be changed after the mapping is finished and individual figures can be saved with a new color.

Panels can be re-arranged



Before logging out, make sure to remove your sample and pump down the chamber. To log out, input the information in the system Log, then input your password and click logout.

Harvard University  
Center for Nanoscale Systems

Official CLEAN Time\*: 3:44:51 PM (Fri)  
\* This is the official time of record CNS will use for billing purposes. Please ignore the local computer time.

**SEM-4 - FESEM Ultra55**

Welcome **Fazel Tafti** your session is running; to disable the tool and end this session enter your password

Your Reservation is from 2018-08-10 2:00 PM to 2018-08-10 3:30 PM (If you are not **Fazel Tafti** [click here](#) to choose a different tool). Please remember to logoff when you are done. Thanks. Machine will not shut down automatically. You must still log out to finish your use.  
*There was an error accessing the interlock. If your system is not enabled try logging out and back in again or contact one of the staff.*

Document Repository for SEM-4  
SOP: SOP055 Ultra55, Ultra Plus and Supra FESEM      SOP: SOP078 Using the Ultra 55, Ultra Plus and Supra FESEMs

**Up Coming (and Current) Reservations**

Start Date and Time	End Date and Time	User	Staff	Notes
2018-08-10 14:00	2018-08-10 15:30	Fazel Tafti		Reservation made by Tim Cavanaugh
2018-08-10 17:30	2018-08-10 19:00	Cleaven Chia		
2018-08-10 20:00	2018-08-10 21:30	Jinhu Dou		
2018-08-10 21:30	2018-08-10 23:00	Hanwool Yeun		

**System Log for this Session - All Fields Required - Scroll Down for Past Entries**

Full Name	Group/ Company	Phone#	Date (yy-mm-dd)	Time In/Out	Detector Used	Comments
Fazel Tafti	Boston College		18-08-10	14:31 / (15:30)	SE2/BSE	OK
Jeffrey Marlow, Tim Cavanaugh	cns	52760	18-08-10	12:20 / 13:46	se2/eds	good (edit)
Maxwell L'Etoile			18-08-10	11:13 / 12:05		(edit)
Jason Trashack	cns	61783	18-08-10	10:40 /	In	OK (edit)

Home | About CNS | User Info | NNIN | Safety | Contact CNS  
CNS User Portal | News & Events  
webmaster @ CNS  
Center for Nanoscale Systems - Harvard University - Cambridge, MA

Waiting for clean.rc.fas.harvard.edu...      3:46 PM 8/10/2018