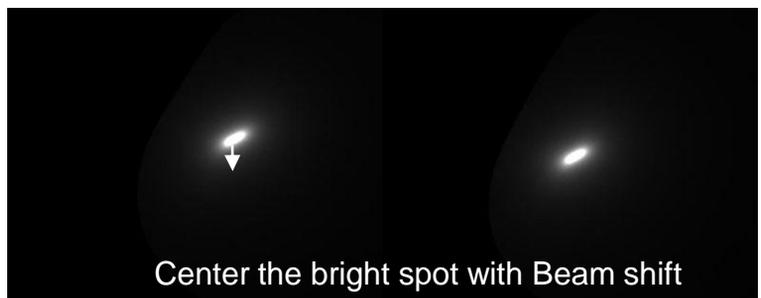
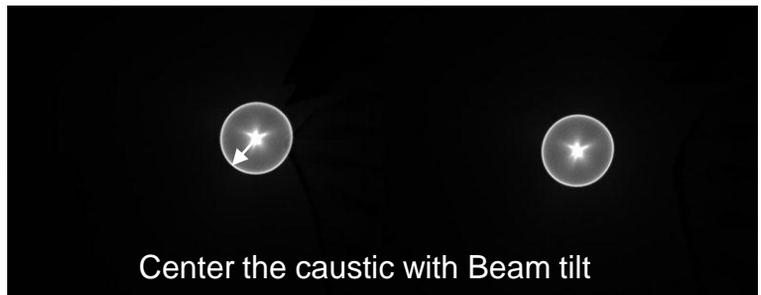
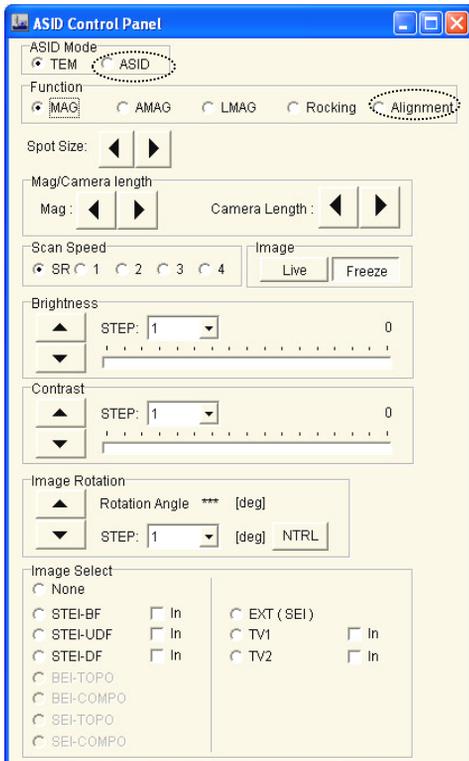


Step 1. ASID alignment mode

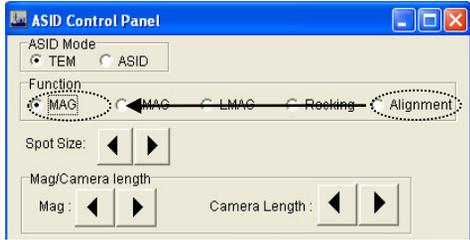
1. Write down STD for TEM, and then open the ASID control window from dialogue. Also, start "Simple imager viewer" program on the Desktop.
2. Click on ASID from the ASID control window, and then select alignment. If scan starts, click on spot  in the "Simple Image Viewer". Choose a desired spot size for example spot M.
3. Turn the Brightness knob fully clockwise, and then, adjust OBJ focus in order to form a caustic spot on the screen, as shown below.
4. Center, the caustic spot with bright tilt/def x, y (often called beam tilt), as shown below.
5. Set the OBJ focus to TEM STD focus (turn the OBJ focus knob until you match OBJ lens voltage with TEM STD focus), and then adjust Brightness knob, to form a bright spot, as shown below. Bring the bright spot to the center with Beam shift x, y.



6. Repeat 1-5 until both caustic/bright spot are centered on the screen.

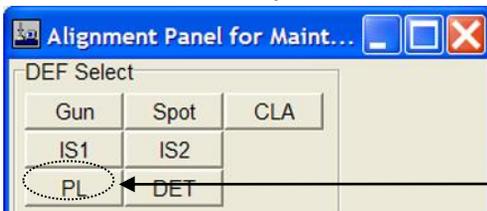
Step 2. ASID MAG mode

1. Switch from “Alignment” to “MAG”, and wait until mode change is completed. Press STD focus again to make sure that you are at STD focus.

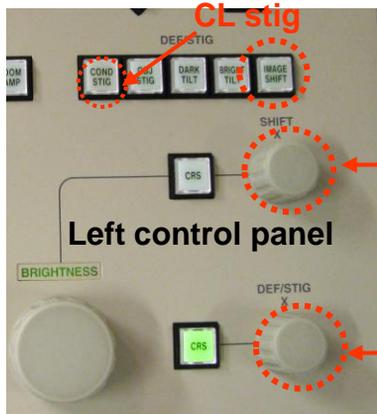


2. Stop scanning by clicking on  in the “Simple Image Viewer”.

3. Find amorphous material on your sample, and then obtain “Ronchigram” by adjusting OL or sample height. Center the Ronchigram with PLA of DEF/STIG x/y. PLA can be activated from the left control panel or PL in alignment window under “Maintenance”.



PL alignment deflector

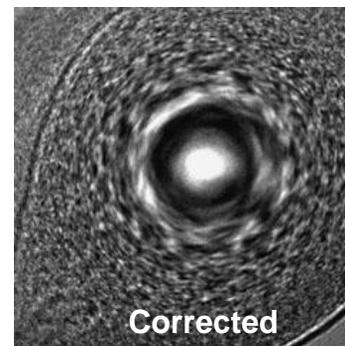
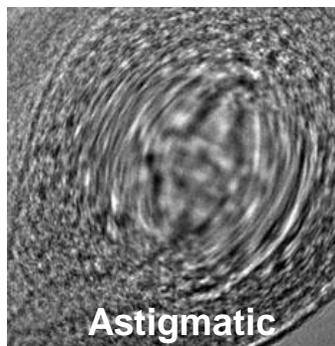
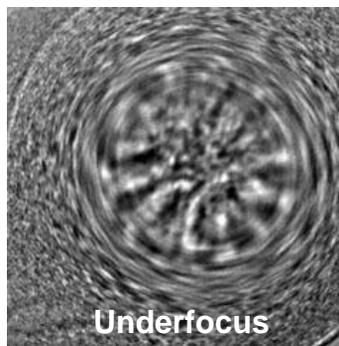
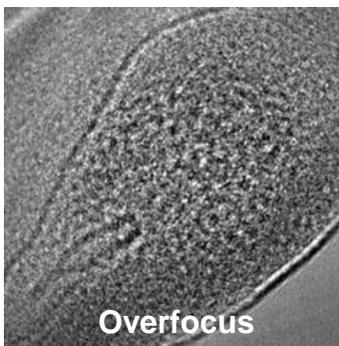


Shift x/y

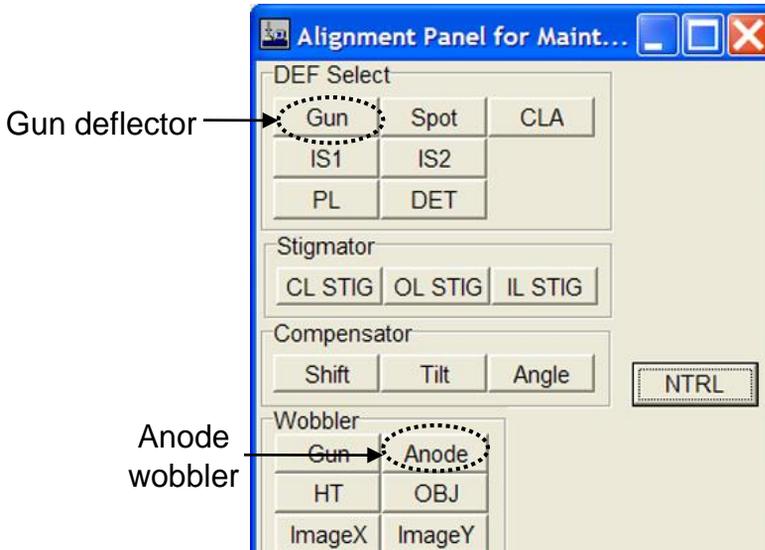
Def/stig x/y



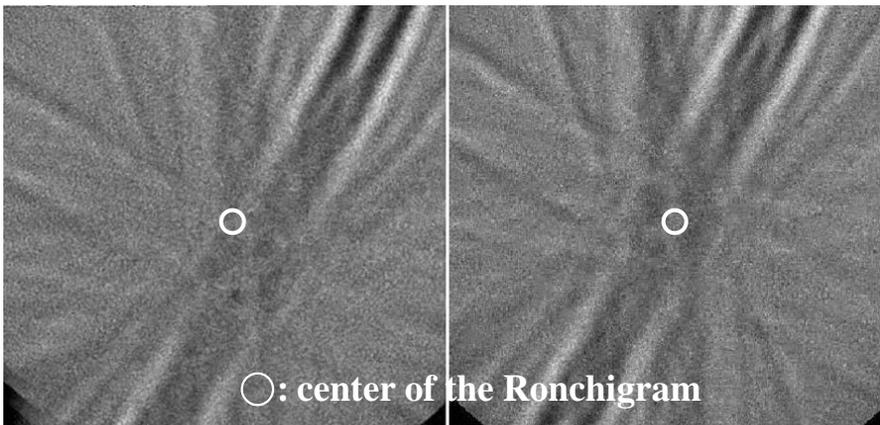
4. Go magnification at least higher than 250k. Higher than 1M is recommended. Press “Cond stig” on the left control panel, in order to correct condenser astigmatism. Make the Ronchigram as round as possible with Def/Stig x/y. See below.



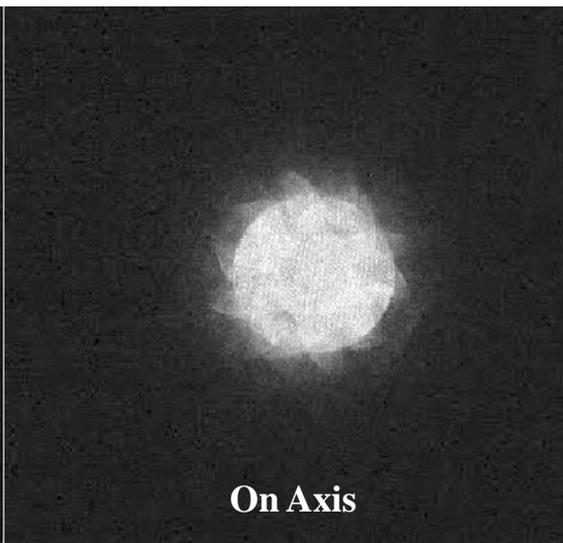
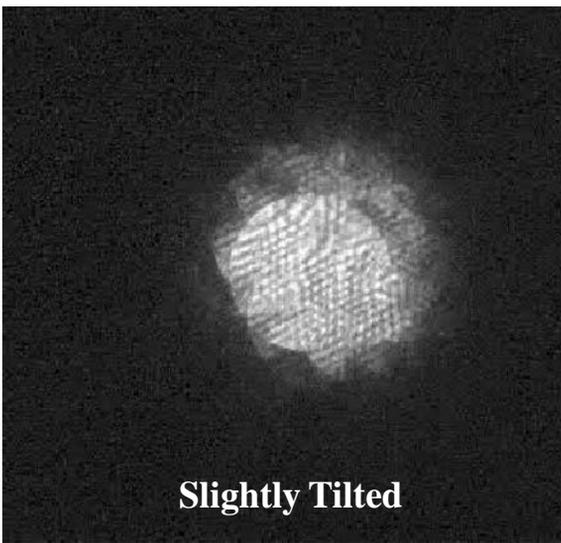
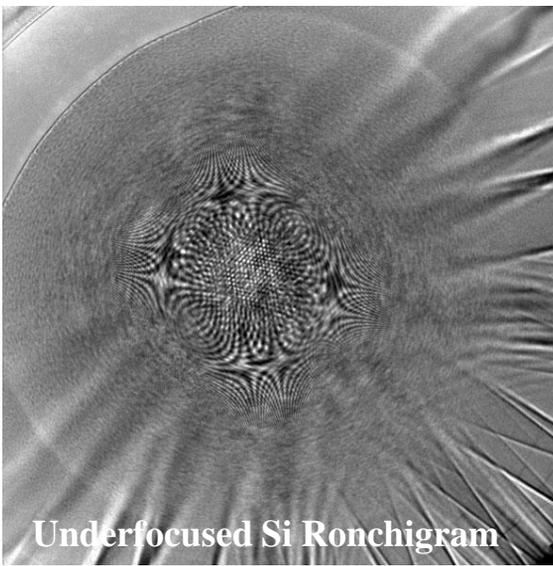
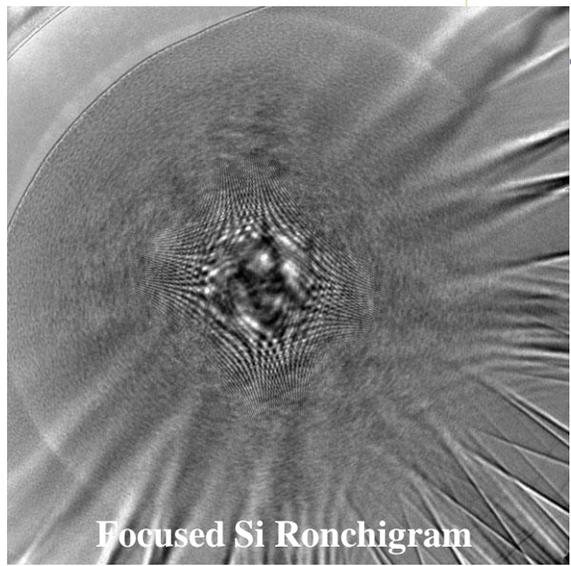
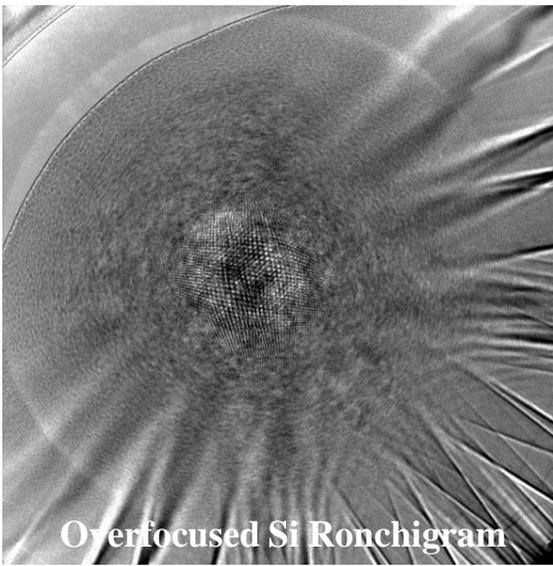
- Click on “Anode” to activate the anode wobbler, then select Gun deflector. Adjust gun tilt with def/stig x/y so that the beam contracts and expands concentrically with respect to the center of the Ronchigram.



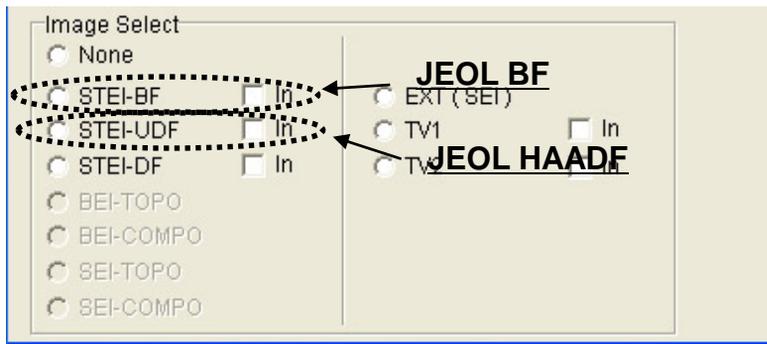
- Mark the center of the Ronchigram (bring the center to the screen center. Move to an area of interest. If your crystal is tilted, you see that the center of the Kikuchi pattern does not match the center of the Ronchigram. Go large over focus. Tilt your sample so that the Kikuchi pattern center matches the center of the Ronchigram, as shown be low.



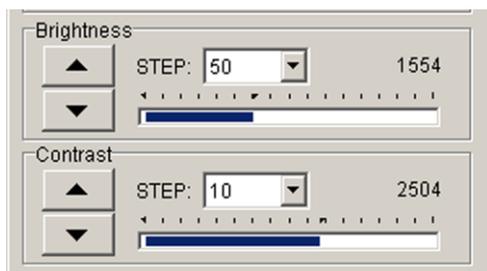
- Now adjust your focus. As you approach the optimum defocus, lattice fringes of your sample will become visible. Remember how the Ronchigram looks like in focus. Insert CL aperture #3 or #4 to the center of the Ronchigram.
- Make sure that there is not crystal tilt. If there is a tilt, carefully tilt your sample to exact zone axis in order to achieve atomic resolution.
- Now the microscope is ready to perform high-resolution STEM imaging.



How to obtain STEM ADF images.



1. For JEOL HAADF detector, first, set camera length to 60~120cm, and then select STEI-DF+ click in. As soon as “In” is checked, the upper ADF is inserted (you hear the sound).
2. Start scanning by clicking on . Adjust OL focus until the image is focused. Adjust CL stig if necessary.
3. Adjust Brightness and Contrast in ASID control panel as you see STEM image in Simple Image Viewer.

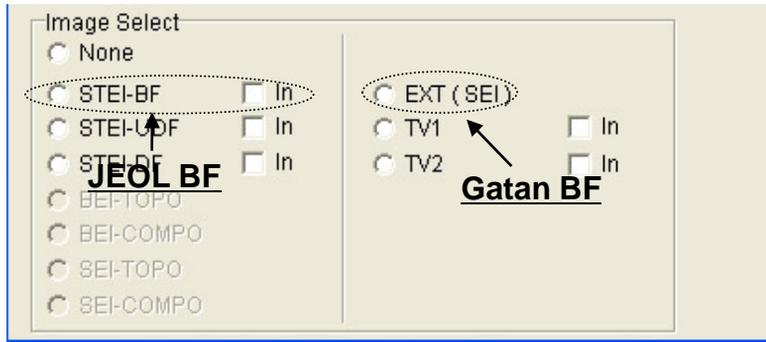


1. For JEOL BF detector, first, set camera length to 100~120cm, and then select STEI-BF+ click In. As soon as “In” is checked, the upper BF is inserted (you hear the sound).
2. Start scanning by clicking on . Adjust OL focus until the image is focused. Adjust PL alignment coil to maximize brightness of your STEM image (centering your beam to the BF detector).
3. Adjust Brightness and Contrast in ASID control panel as you see STEM image in Simple Image Viewer.

How to obtain STEM BF images.

After the STEM alignment described above.

- For JEOL BF detector, set camera length to 40cm or larger, you can also insert HC aperture #3 or #4 to the center of the Ronchigram, if you would like to make the collection angle smaller.
- Insert JEOL BF detector manually, and put screen cover on the viewing chamber.
- Select STEI-BF and Click on  in the “Simple Image Viewer”. control window, and then,
the microscope starts scanning.

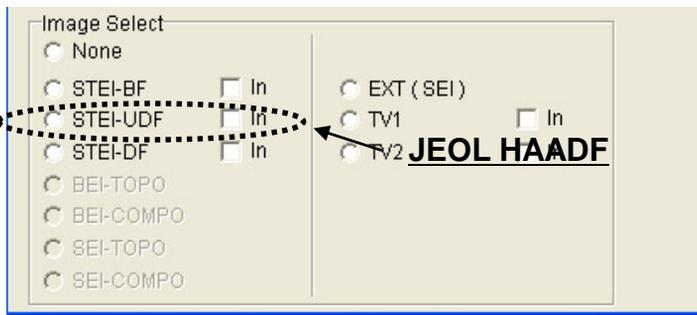


4. Focus the image by OBJ fine. If necessary, adjust CL stig.

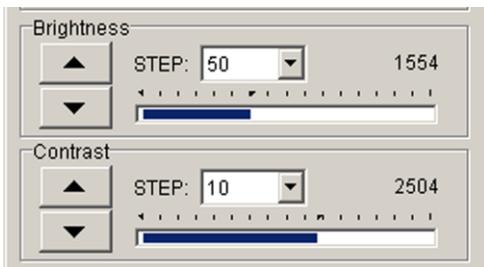
- For Gatan BF detector, set camera length to 8cm or larger, you can also insert HC aperture #3 or #4 to the center of the Ronchigram, if you would like to make the collection angle smaller.
- Insert Gatan BF detector by pushing the BF button on the Gatan detector controller, and lift the screen by pressing F1 on the right control panel. Put screen cover on the viewing chamber.
- Select Ext in the ASID control window, and then, click on .
- First, focus with OL, and then center the beam with PLA, by maximizing the contrast in the image. If necessary, correct astigmatism.

Step 1. Things to do in TEM

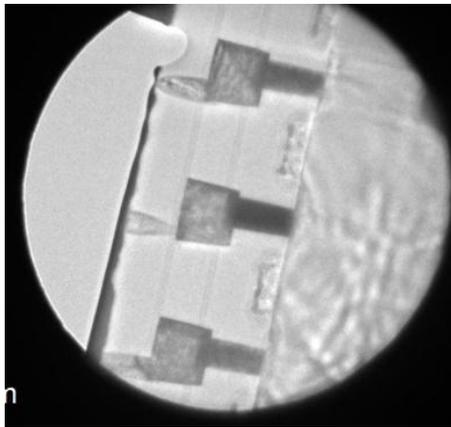
- Perform standard TEM alignment with CL aperture #3 or #2.
- Find a distinctive feature in your sample and bring it to center of your screen. Focus and take an image for reference.
- Click on ASID from the ASID control panel under “Dialogue”, and then select “MAG”. Choose a desired spot size for example spot M.
- Set camera length to 60~120cm, and then select STEI-UDF+ click in. As soon as “In” is checked, the upper ADF detector is inserted (you hear the sound).



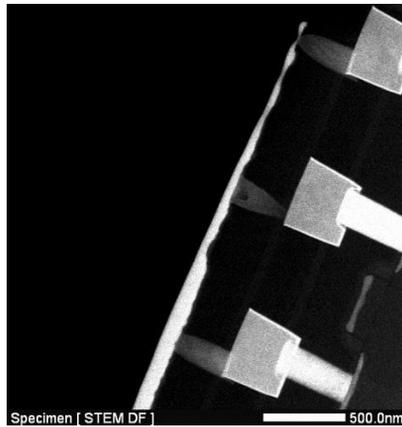
1. Go to “Simple Image Viewer”.
2. Adjust Brightness and Contrast in ASID control panel as you see STEM image in Simple Image Viewer.



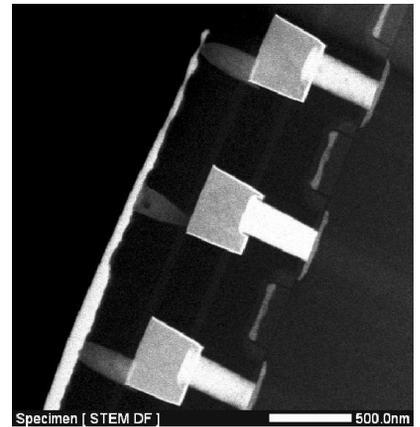
1. Find the feature you found in TEM. If necessary, lower your magnification, and then focus.



TEM image of feature

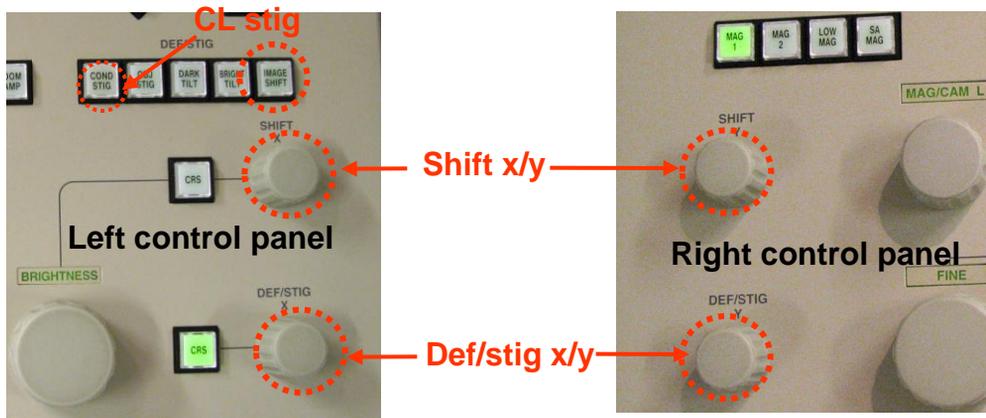


STEM image

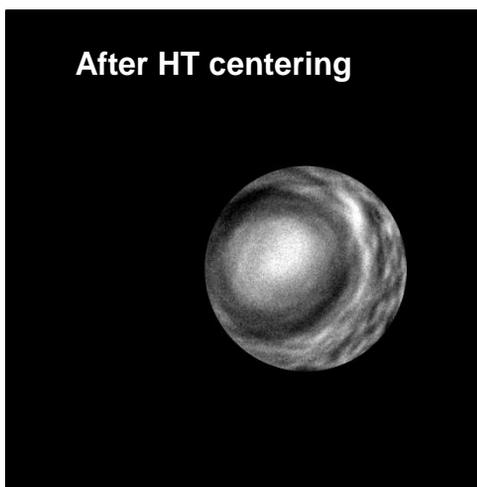


After centering

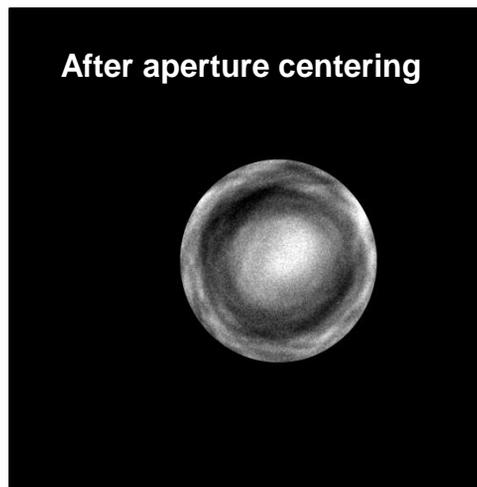
1. Press "Bright Tilt" on the left panel control, and then use shift x and y to bring the feature to the center of scanning image.
2. Select super rapid scan SR in Simple Image Viewer.
3. Turn on HT Wobbler, and make the wobbling concentric with Def/Stig x/y (while Bright Tilt is still pressed).



1. Click on  in Simple Image Viewer to stop scan, and then look at the Ronchigram with CL aperture still inserted.

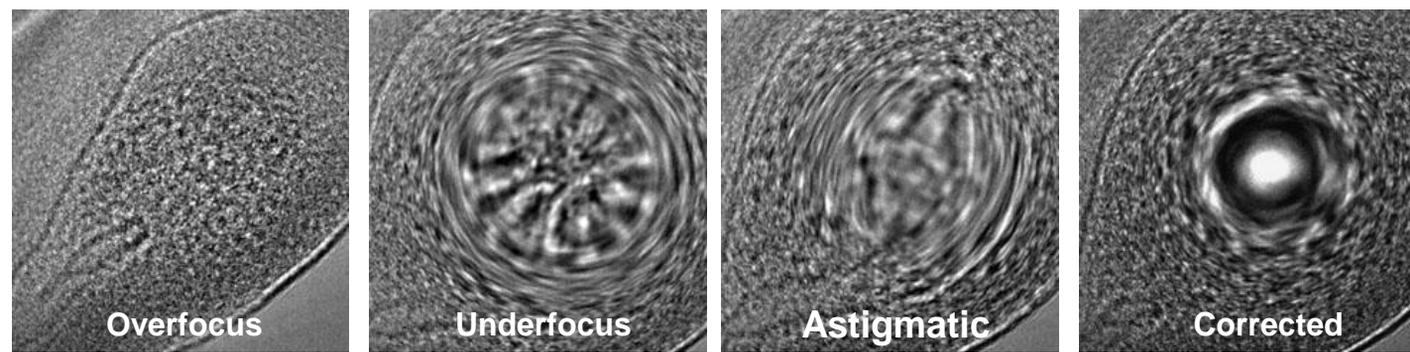


After HT centering



After aperture centering

1. Center the CL aperture with respect to the Ronchigram center using Def/stig x,y with Bright Tilt pressed, as shown in the previous page. If necessary, correct astigmatism with Def/stig x,y after pressing "Cond Stig".
2. If it is difficult to correct astigmatism with CL aperture inserted, mark the center of your aperture, and then retract CL aperture. Correct astigmatism, making Ronchigram round, and then re-insert CL aperture to exactly where it was before.



1. Now you can move to [step 5](#) in original alignment