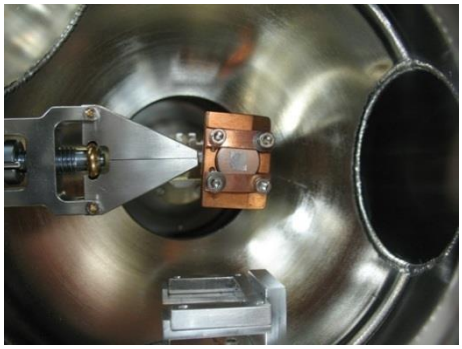
The UHV loadlock is used to load a sample and can accommodate up to 3 samples under vacuum. There is also a heater stage that can be used to anneal a sample up to 400°C.

Loadlock venting

1. Before venting the loadlock, if the measurement is complete, typing **setBEAM off** to close the Photon Shutter 4 and the gate valve between the beamline and the RSXS endstation. If the measurement is still going on, move to the next step.
2. Confirm the manual gate valve between the loadlock and the scattering chamber is closed.
3. Switch off the loadlock Ion Gauge (IG1); switch off the loadlock turbo pump; then switch off the rough scroll pump outside the REIXS hutch.
4. Open the manual N2 valve and unlatched the knob on the loadlock door to avoid over-pressure. After the turbo pump speed is less than 750 Hz, the N_2 is automatically introduced to the loadlock and the venting is started. Wait about 15 minutes until it reaches 760 Torr.
5. Open the loadlock door to load or take out samples on the sample stage. Close the N2 valve immediately after.

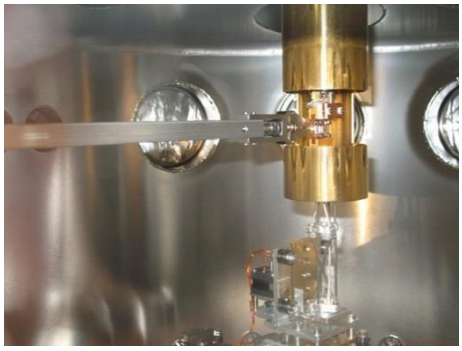
Warning: When using permanent magnets on sample holders, load one sample at a time. The magnets will attract to each other in the loadlock chamber.

Loadlock pumping down and sample transfer



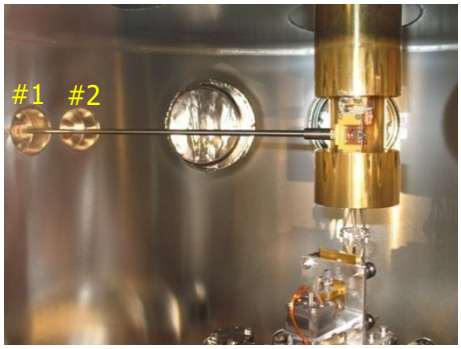
1. Close the loadlock door and verify the N_2 valve is closed.
2. Switch on the rough scroll pump and then switch on the turbo pump.
3. When the turbo pump is at full speed (1500 Hz), and the Convectron gauge shows 0.00, switch on the ion gauge (IG1) of the loadlock.
4. Usually it takes about an hour to reach low 10^{-7} Torr. Only transfer sample when pressure in the loadlock is less than $5x10^{-7}$ Torr.

5. The magnetic transfer arm has two drives. Rotating the front drive will rotate the sample. Holding the front drive while rotating the back drive will open or close the jaws.



6. Using the transfer arm, pick up one sample from the sample stage. Bring the transfer arm closer (~1-2 mm away) to the sample holder. Level the sample holder eye hole tab to the slot at the centre of the jaws horizontally, by adjusting the sample stage linear drive.
7. After the jaws are fully close, retract the transfer arm and lower the sample stage down.
8. Open the manual gate valve between the loadlock and the scattering chamber.
9. Move theta to 55^{o} (**umv th 55**). Make sure that the typical sample transfer position is in place: x is around 7-8 mm and z is around 0-1 mm (**umv x 7 z 0**) and the detector arm is not blocking the way for the transfer (**umv tth 105**).
10. Bring in the transfer arm and rotate 90 deg so that the sample holder is oriented vertically.
11. Insert the sample holder into the sample receptacle in the scattering chamber, by opening the jaws of the transfer arm and release the sample holder.
12. Pull the transfer arm all the way back and close the manual gate valve.
13. Move theta to 140^{o} (**umv th 140**). Insert the vacuum screw driver #2 to tighten the screw on the sample receptacle to secure the sample in place.

    If the screw does not catch the sample holder, bring the screw driver #1 all the way in until the longer set screw on the edge of the screw drive #1 (orthogonal to the main screw driver) passes the edge of the sample holder. Gently pull back the sample holder and tighten the screw on the sample receptacle by the screw driver #2.



14. To change the sample, move theta to 140^{o} (**umv th 140**) and loosen the screw on the sample receptacle. Then move theta to 55^{o} (**umv th 55**) and move to the sample transfer position (**umv x 7 z 0**) and move the detector arm to safe position (**umv tth 105**).
15. Type setBEAM off to close the Photon Shutter 4 and the gate valve between the beamline and the RSXS endstation.
16. If the loadlock vacuum is good (<5x10^{-7} Torr), open the manual gate valve and take out the sample using the transfer arm and place it on the loadlock sample stage.