**Omicron LEED start up and shut down procedures**

1. **Make sure old AES (Auger) is clear.** Move Sample manipulator to 1280. Then turn LEED knob to **XX** turns.
2. Press the Mains switch and select LEED mode.
3. Set Wehnelt = 0.
   1. You can adjust this if desired; however, this changes the emission current IE drastically which can result in an increase of the filament current to its limit!
      1. Set the Wenhlet voltage before activating the emission current.
         1. For good focus: -20 V
         2. For cutoff: -38 V
4. Set Emission current ( IE ) 1 to 50 s. (Anything above this will make for an unstable beam).
   1. If turned fully clockwise then the emission current is not limited.
5. Warm up filament
   1. Two options to do this:
      1. Option 1:
         1. Turn filament current to 1 Amp and wait for 10 mins
         2. Slowly turn up for operation
      2. Option 2:
         1. Slowly turn up filament by small half turn (inner 0-5) increments every 1-2 minutes.
      3. 1.7 - 2.7 Amps for operation (emission current is about 20 microamps)
         1. If you switch filaments from W/th to LaB6 filament type this changes the filament current limit to 1.7 A.

**Key note**: is that pressure does **not go above 5E-8 mbar/3.7E-8 torr!** \*If so this could damage the filament in the LEED while LEED is probably outgassing.\*

1. Turn Suppression all the way up. (Only active in LEED mode)
   1. This is turned off when fully counter clockwise.
   2. Range is 80%-110% of beam energy
2. Turn off the RGA filament and the Ion gauge.
3. Set energy to desired level (ex: 50 eV)
   1. Max energy us -1 kV
4. Turn off room lights and make sure that no light is going near/into LEED.

**DO NOT TURN UP THE SCREEN HV KNOB UNTIL ALL LIGHTS ARE OFF!**

1. Turn on Screen knob up to desired level and set to 6.00 kV on the knob
   1. This is active in LEED mode only! (when you turn this up the background light can
2. Adjust L 1/3 and L2 to get a good pattern. (both active in LEED mode only)
   1. Offset L 1/3 range: -20 to 100 V; offset L2 range: 0 to 100 V
   2. Gain L 1/3 range: 0 to 1kV with respect to the cathode.; Gain L2 range: 0 to 2.5 kV with respect to cathode.
      1. Varies proportionally to beam energy

**Remember: Turn off the screen HV knob by going to zero on Screen knob before turning the lights on!**

1. Pull LEED out by turning the knob back to zero turns.

-This allows you to move the sample holder if you want to do something else after LEED.

13. Turn down the filament to zero, beam voltage to zero, and Lenses (1/3 and 2) to zero. Turn off LEED mains supply (button).

**Notes**:

Digital push buttons: L2 = Lens 2 (V); L 1/3 = Lenses L1 and L3 (V); Ifil = Filament current (A); E = Electron Beam energy (eV); Suppr = Suppresor grid potential (V); Wehnelt = Wehnelt cylinder potential (V); IE = Emission current (mA) -> measured at the anode; I0 = Beam current

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| --- | --- | --- | --- |
| LEED running specs | | | |
| Screen HV: 6 kV | Pressure: 5.0E-9 mbar |  |  |
| Filament current : 2.3 A | Wehnelt: -20V | | |
| E (eV) | Ie (micro Amps) | Lens 1/3 (V) | Lens 2 (V) |
| 34 | 0.08 | 119 | 115 |
| 100 | 0.2 | 230 | 153 |
| 200 | 0.3 | 456 | 234 |
| 500 | 0.7 | 1122 | 461 |

|  |  |  |  |
| --- | --- | --- | --- |
| LEED running specs | | | |
| Screen HV: 6 kV | Pressure: 5.0E-9 mbar |  |  |
| Filament current : 2.3 A | Wehnelt: -10V | | |
| E (eV) | Ie (micro Amps) | Lens 1/3 (V) | Lens 2 (V) |
| 34 | 0.1 | 119 | 115 |
| 100 | 0.35 | 230 | 153 |
| 200 | 0.45 | 456 | 234 |
| 500 | 1 | 1122 | 461 |

**Outgassing procedures**

When you turn on the LEED after its been not used/exposed to atm there will be a bunch of gunk on the filament and the surrounding area near the LEED as well as some extra electrons hanging around. When you turn up the filament you will notice some outgassing between 1-2 A with emission current knob set to max. This may become unstable as the extra junk on the LEED can be conductive. This means that the Beam voltage (VE button) can become unstable. When this happens the power supply of the LEED could cause some damage to the electronics and the LEED if left this way. You will need to turn down the emission current until you get a stable beam. (you can also turn off the beam voltage).

There are essentially 3 stages of outgassing for UHV parts in a UHV system:

1. whatever is stuck to filament

2. whatever is stuck to things near filament (from radiative heating)

3. similar to 2, but from electron emission effects

#1 on that list starts early, and mostly picks up when the filament is glowing a bit. #2 is when it is glowing enough to heat other things nearby. You can get a mix of 2 and 3 sometimes which results in a huge pressure spike.