Monochromator Update - Week 10

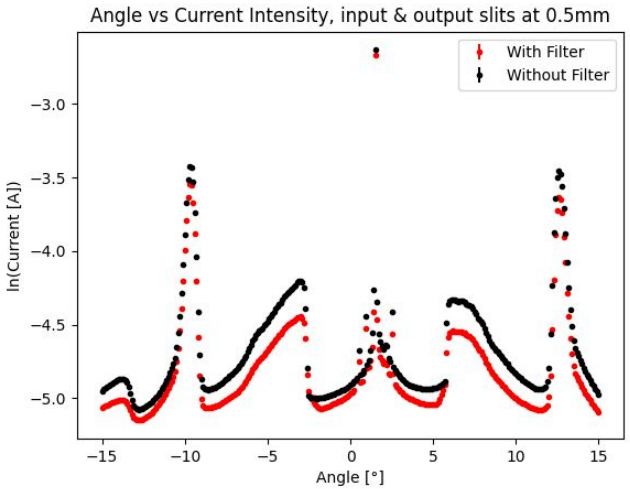
M&M

Recap

- Identified which parts of measured spectrum contain UV light using filter
- Expect 265nm light out at scan angles of ±11.19° (if no offset)

Next Steps

- Use iris or collimator and investigate impact
- Redo Blue light measurement
- Calibration Curve

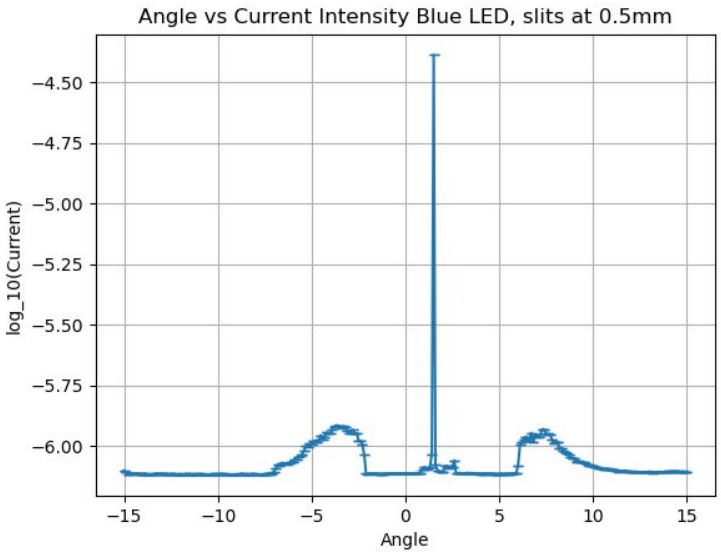


Current output with/without 18B wratten filter

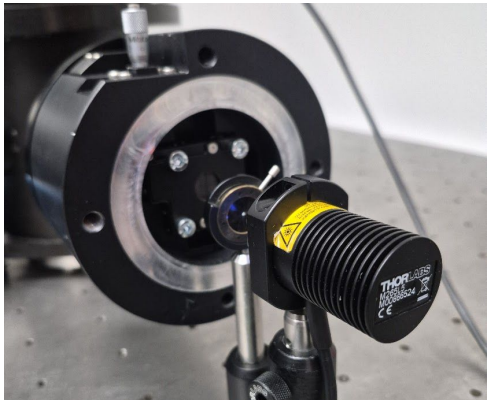
Blue LED Spectrum (Redone)

- Wavelength ~ 450 nm
- Scan angle for first diffraction order expected at ~ 20°

- Confirms that Artefacts at 5° - 10° are not diffraction orders
- Confirms m = 0 central peak location



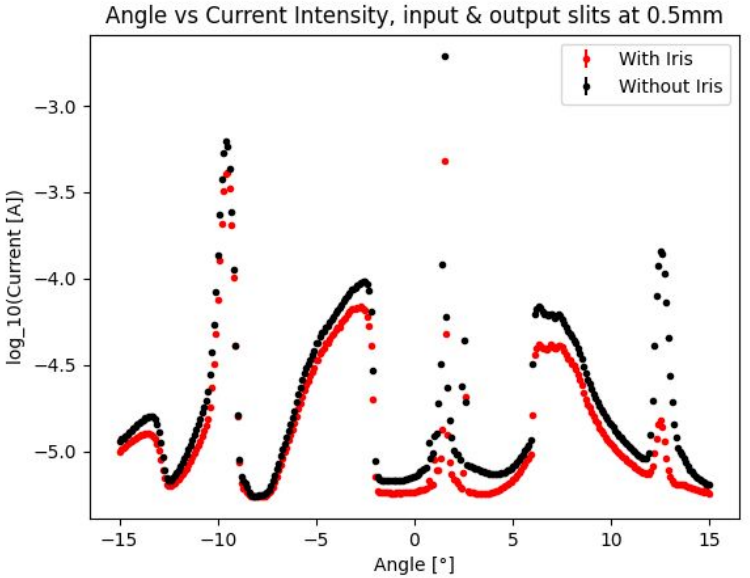
Initial Trial Using Iris



- Set to 0.8 mm aperture

- m = 1 order much less intense with iris
- m = -1 order unchanged with iris

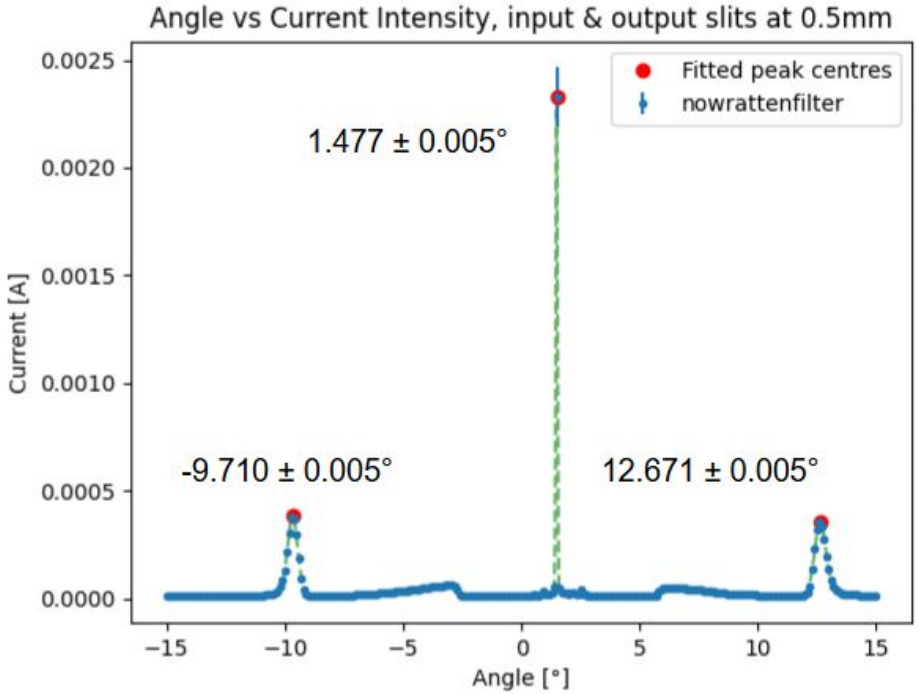
- Likely due to misalignment of LED relative to Iris or Iris placed too close to slits.



Wavelength Offset

- 265 nm LED expected at ±11.19°
- Scan over m= 1,0,-1 diffraction orders
- Fit to gaussian on a linear background to extract diffraction order positions

- Corresponds to a 35.3 nm offset



$$\Delta\lambda = 2d \cos K \sin\theta_0$$

$$\bar{\theta} = \frac{\theta_R - \theta_L}{2} \approx 11.19°$$

$$\theta_0 = \frac{\theta_R + \theta_L}{2} \approx 1.481°$$

Calibration Curve

- Assumes perfect actuator accuracy (scale factor = 1)

$$\lambda \approx 1365 \sin(\theta - 1.481)$$

- For Xe 175nm ~8.8°
- For Ar 128nm ~6.7°
- Both within artefact region