

Monochromator Update - Week 9

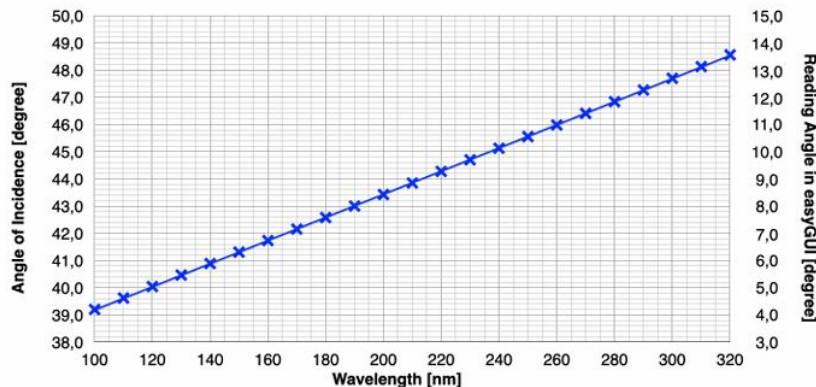
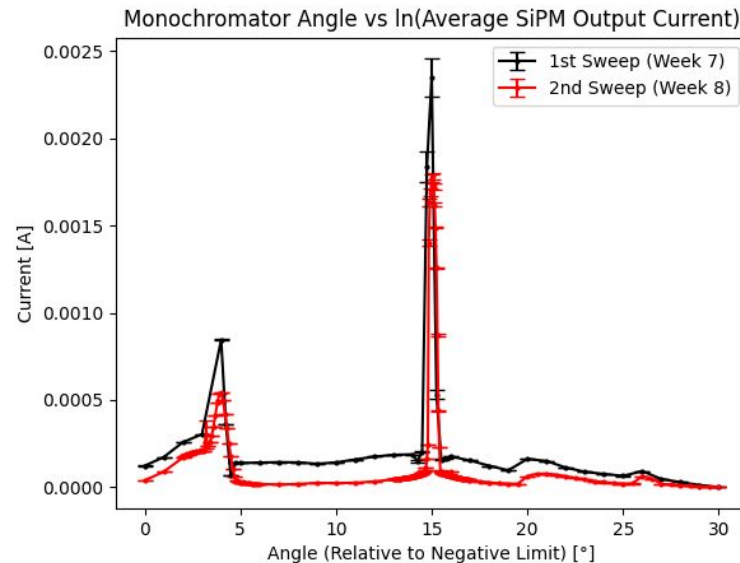
M&M

Recap

- Saw large peak at 0° and (what we thought was) an erroneous peak at 4°

Objectives

- Investigate output changing slit size
- Identify diffraction orders using different LED
- Use filter to remove visible light

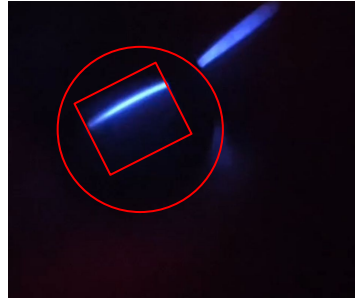


Results when varying exit slit

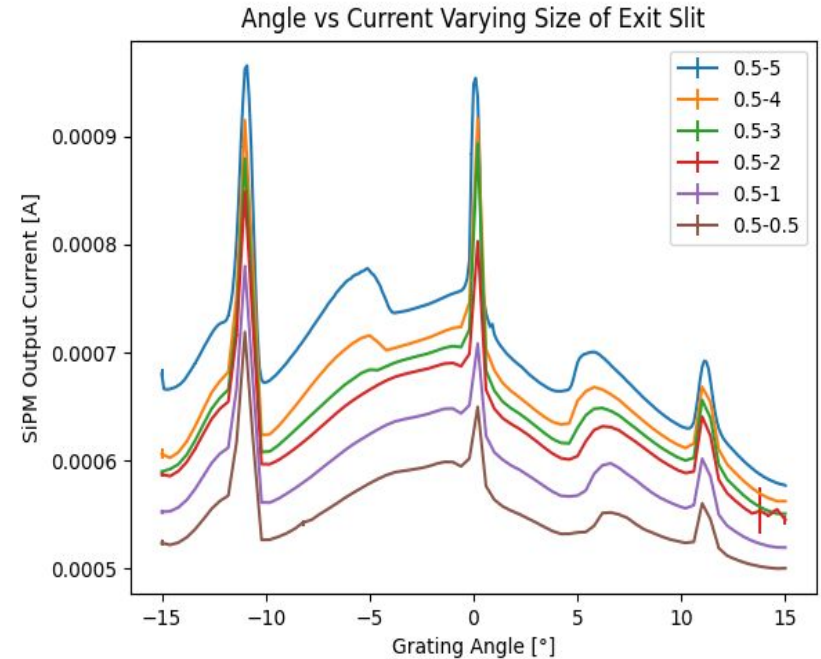
- Peaks at $\approx \pm 5$ change shape when exit slit varied
- Implies they are not diffraction orders



Central maximum



Artifacts either side of central maximum



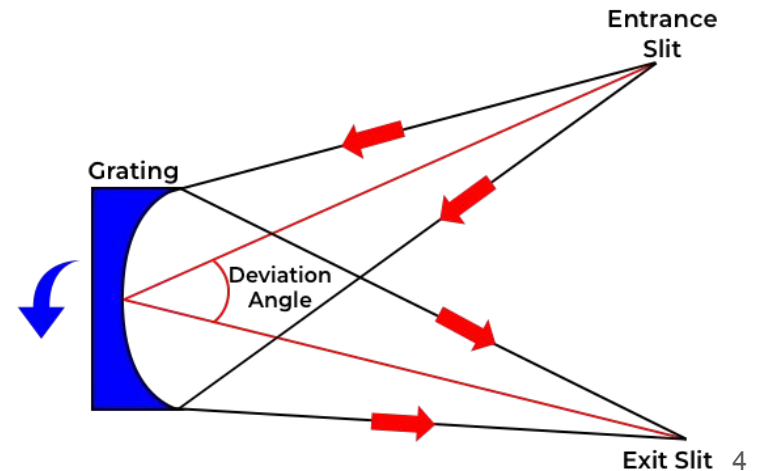
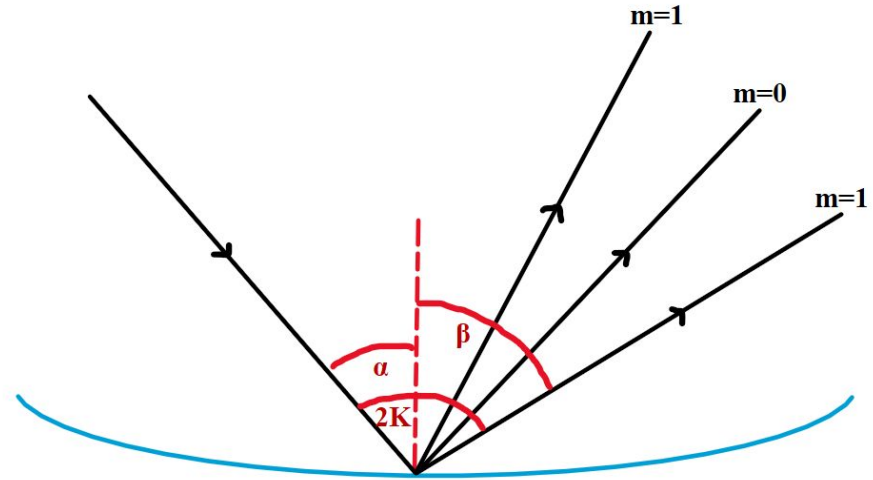
Fixed Deviation Geometry

- For 267nm LED, expect $m=1$ peaks at $\theta = \pm 11.2^\circ$
- For any source, expect $m=0$ peak at $\theta = 0^\circ$

$$m\lambda = d(\sin \alpha + \sin \beta)$$

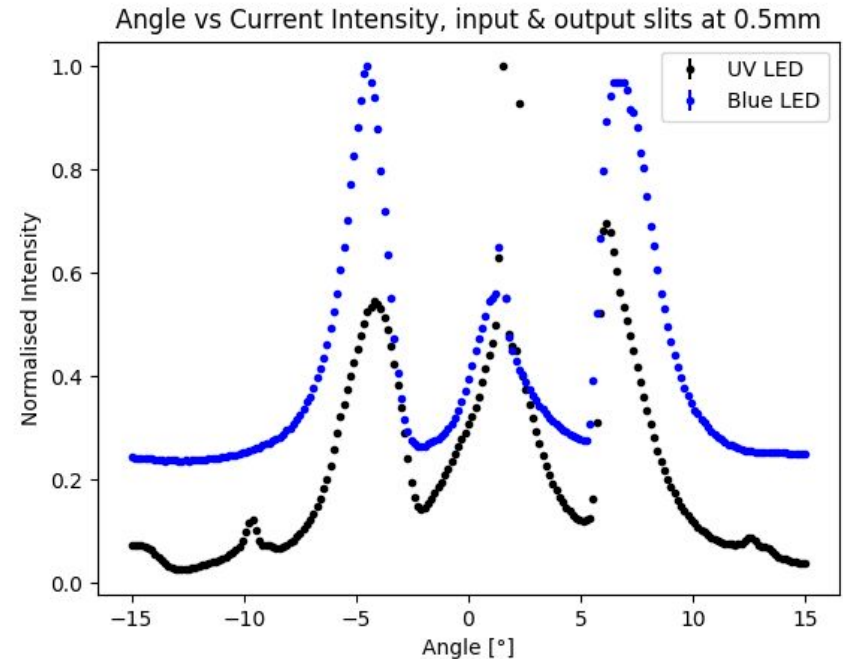
$$2K = \beta - \alpha \quad \alpha = \theta - K, \quad \beta = \theta + K$$

$$m\lambda = 2d \cos K \sin \theta$$



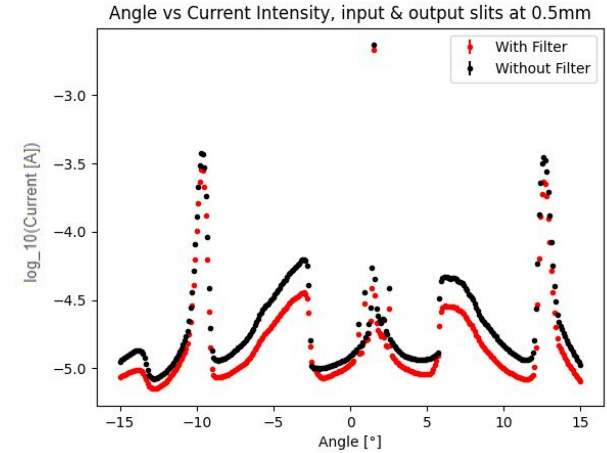
Blue vs UV LED Results

- For 460nm Blue LED expect first order at 20° → should only see central peak(s)
- Three central peaks are not diffraction orders
- → Small peaks are $m=\pm 1$ diffraction order $\approx 11^\circ$
- Use symmetry of diffraction orders to find centre

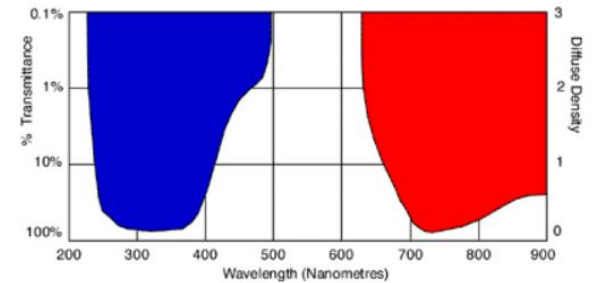


Filtering Visible Light

- Using Wratten Filter to absorb visible light from UV LED
- All peaks except diffraction orders have a reduced intensity
- Artifacts and central order are mostly UV but contain visible light (for purley visible expect 100x decrease)

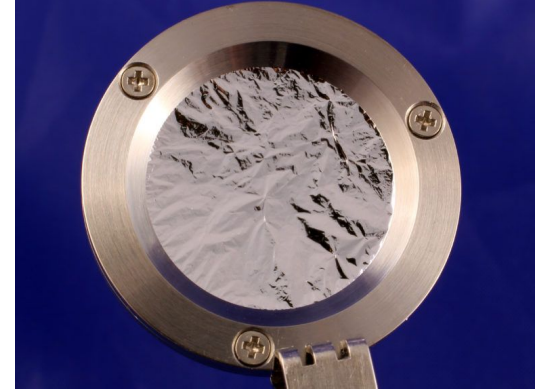


Transmittance of Wratten Filter 18B



Filter Attachments on Monochromator

- Uses LEBOW LS1.5 filters
- Filters not advertised
- UHV Sandwich mounted Al foil foil



<u>TYPE</u>	<u>APETURE</u>	<u>3-9 Pieces</u>	<u>10-29 Pieces</u>	<u>30 or more Pieces</u>
LS0.5	5.0mm	\$94.00	\$75.00	\$66.00
LS1.0	10.0mm	\$94.00	\$75.00	\$66.00
LS1.34	13.4mm	\$132.00	\$105.00	\$92.00
LS1.5	15.0mm	\$142.00	\$113.00	\$99.00

Next Steps

- Preliminary vacuum measurements
- Use xenon light source with multiple peaks for final calibration
- Email EasyLIGHT about minimising stray light
- Alignment of optics greatly affect measured spectrum (Need collimator Or Pinhole?)
- Verify Blue light results (We think it was misaligned)