Polarization
FYS2150 Lab Report

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Abstract

Studying the properties of linearly and circularly polarized light and testing how well the properties match up to theoretical predictions.

1 Introduction

2 Theory

3 Experimental Procedure

In order to minimize the effects that ambient light may have on the following experiments, the windows in the room were covered up and all lights not related to the experiment were turned off whilst data was being recorded, or observations were made.

3.1 Checking the polarization of the spectral lamp

In order to determine whether or not the light emitted from a specific Sodium spectral lamp, the intensity of light was measured using a luxmeter after having gone through a polarization filter of variable angle acting as an analyzator, depicted in Fig 1. When changing the angle of the analyzator, we defined a positive and negative direction, which was kept for all subsequent measurements using polarization filters. The angle of the polarization filter was changed in 10° increments in the range −90° to 90° and the intensity of the light measured by the luxmeter was noted for each angle.
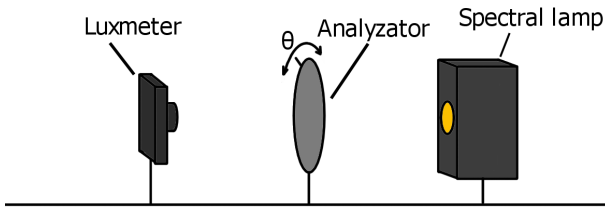

Figure 1: Aparature to test the polarization of light emitted from a spectral lamp using a polarization filter with variable angle θ as an analyzator and measuring the intensity of the filtered light using the luxmeter.

3.2 Testing Malus' law
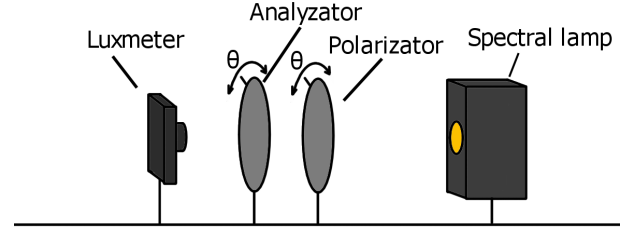

Figure 2: Aparature to test Malus' law.

4 Results

The intensity measurements presented in table 1, where light from a spectral lamp is passed through a single polarization filter has a standard deviation of 19, which is used as the estimated uncertainty for further measurements made with the luxmeter.

Table 1: Measured intensity when passing unpolarized light through a single polarization filter, θ denoting the angle of the filter. Aparature depicted in Fig. 1

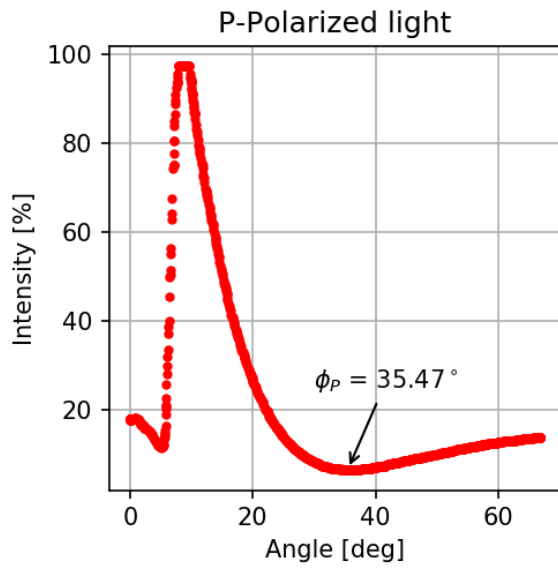| θ [deg]	Intensity [Lux]
0	705
-10	701
-20	706
-30	718
-40	726
-50	734
-60	743
-70	751
-80	756
-90	759
10	703
20	713
30	719
40	726
50	736
60	745
70	753
80	758
90	754

Figure 3: Intensity profile due to p-polarized light, where ϕ_P denotes the Brewster angle.
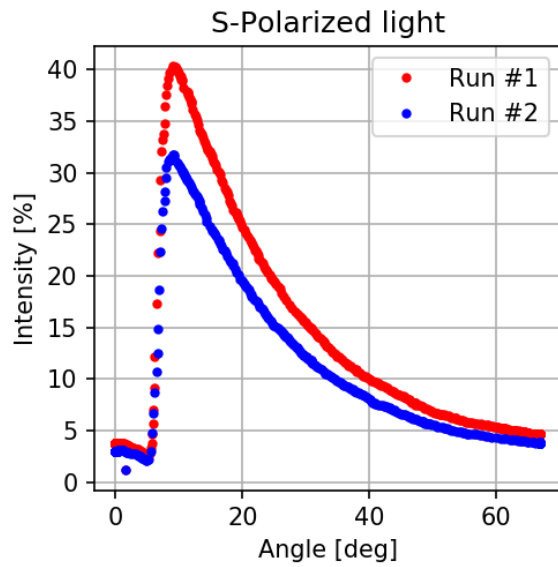

Figure 4: Intensity profile due to p-polarized light from two separate attempts of the experiment.

5 Discussion

6 Conclusion

References