Physical Experiments I

Pre-lab Assignment

Experiment Title

Polarized Light

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Date Performed:

Score

Answers to Questions (20 points)

(1) How much polarized light is passed by a combination of the first polarized and a second that has its polarization axis at 30° with respect to the first?

We know when the beam pass via the polarize, it will loss some part of the light. We just follow the equation from the text book.

$$\mathbf{I}=\boldsymbol{I_0}\cos^2\boldsymbol{\theta}$$

$$\mathbf{I}=\boldsymbol{I_0}\cos^2 30°$$

We can get the $\boldsymbol{I}=\frac{3}{4}\boldsymbol{I_0}$

(2) Explain what Brewster's angle is. Calculate Brewster's angle and its uncertainty for a piece of glass with an index of reflection of n=1.4±0.2.

A particular angle is a position which only some part of the light can be reflected and all the reflected beam shows partial polarization when the light is incident on a transparent medium.

I calculate it by using the matlab and the program are as follows:

```
>> [i,n]=solve('i=atan(n)','n=1.4','i','n')
```

and:

```
>> [i,n]=solve('i=atan(n)','n=1.6','i','n')
```

and:

```
>> [i,n]=solve('i=atan(n)','n=1.2','i','n')
```

results are:

```
i =


0.95054684081207514789478913546382



n =


1.4
```

and:

i =

1.012197011451334183259813475238 1

n =

1.6

and:

i =

0.876058050598193423114047521128 34

n =

1.2

>>

1.01-0.95=0.06

0.95-0.88=0.07

We choose the bigger one as the uncertainty: σ =0.07;

The answer are i=(0.95$\pm$0.07)rad

The answer can also be written as i=54° $\pm$ 4°

(3) How many types of polarized lights are involved in this experiment? Give their names.

There are three types of polarized light mentioned in this experiment, which are linearly polarized light, elliptically polarized light and circularly polarized light.