**Newton’s Rings**

Group 12

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**Aim:** To observe Newton’s rings formed by the interference produced by a thin air ﬁlm and to determine the radius of curvature of a plano-convex lens.

**Apparatus:** Travelling microscope, sodium vapor lamp, plano-convex lens, plane glass plate with mount, magnifying lens.

**Procedure:**

1. After switching on the light source the glass plate with a mount at was aligned at an angle of 45 degrees to the path of light.
2. The assembly of the lens and the glass plate was aligned exactly below the mount so that the reflected light was normal to it.
3. The travelling microscope was aligned and adjusted above the inclined glass plate to see the interference pattern.
4. The black reference line was made vertical and then aligned with the 20th dark fringe and successive readings were taken.

**Observations:**

Least count =0.001cm

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Wavelength=5893 A |  |  |  |  |  |
| no. of dark fringe(m) | radius left(cm) | radius right(cm) | diameter | diameter^2 | 4\*m\*wavelenght(cm) |
| 0 | 0.052 | 0.058 | 0.11 | 0.0121 | 0 |
| 2 | 0.093 | 0.094 | 0.187 | 0.034969 | 0.00047144 |
| 4 | 0.136 | 0.143 | 0.279 | 0.077841 | 0.00094288 |
| 6 | 0.169 | 0.163 | 0.332 | 0.110224 | 0.00141432 |
| 8 | 0.183 | 0.188 | 0.371 | 0.137641 | 0.00188576 |
| 10 | 0.198 | 0.208 | 0.406 | 0.164836 | 0.0023572 |
| 12 | 0.219 | 0.225 | 0.444 | 0.197136 | 0.00282864 |
| 14 | 0.235 | 0.238 | 0.473 | 0.223729 | 0.00330008 |
| 16 | 0.248 | 0.252 | 0.5 | 0.25 | 0.00377152 |
| 18 | 0.257 | 0.262 | 0.519 | 0.269361 | 0.00424296 |
| 20 | 0.28 | 0.288 | 0.568 | 0.322624 | 0.0047144 |

**Graph:**

The graph is between (diameter)^2 of mth order fringe vs 4\*m\*wavelength

dotted line is line of best fit.

**Calculations:**

D^2=4\*m\*(wavelength)\*R

For m=2

0.034969= 4\*2\*(0.00005893)\*R

R=56.71cm

**Error Analysis:**

1. In order to remove Backlash, we made sure the travelling microscope moved in only one

direction throughout the experiment.

2. We had to make sure the glass plate was at 45 degrees.

**Precautions:**

1. The microscope should be parallel to the edge of the glass plate.
2. The travelling microscope should move only in one direction.
3. If you place the cross wire tangential to the outer side of a particular ring on one side of the central spot, then the cross wire should be placed tangential to the inner side of the same ring on the other side of the central spot.

**Result:**

So the radius of plano convex lens is 56.71cm.