WAVES AND OPTICS

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Physics Lab III

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Every honest researcher I know admits he's just a professional amateur. He's doing whatever he's doing for the first time. That makes him an amateur. He has sense enough to know that he's going to have a lot of trouble, so that makes him a professional.

— Charles F. Kettering (1876-1958) (Holder of 186 patents)

ACKNOWLEDGEMENTS

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Part I

EXPERIMENTS

1 NEWTON'S RING

August 14 and 21, 2012

1.1 AIM

To study the fringes of equal thickness in the Newton's ring setup and hence determine the wave-length of sodium light.

1.2 APPARATUS

Sodium vapour lamp, travelling microscope, lens assembly consisting of a plane glass plate and a planoconvex lens, spherometer, magnifying glass, vernier callipers and a tiltable glass plate assembly.

1.3 THEORY

1.4 OBSERVATIONS AND CALCULATIONS

h was found out to be 0.25 mm = 0.025 cm.
l was found out to be $\frac{4.668+3.874}{2} = 4.271$ cm. (For details, refer to Table 2)
Using these, $R = \frac{l^2}{6h} + \frac{h}{2}$ turns out to be 121.6211 cm.

Observations for diameter of the ring are given in Table 1.
Slope of the graph of Diameter Squared, D_m^2 vs Order of Ring, m was found to be 0.0291 cm. (Figure 1)
Using the relation

$$(D_m)^2 = 4R\lambda m \tag{1}$$

$\lambda = 598.16 \pm 3.25\%$ (where the error is calculated from the standard deviation of the slope).

1.5 RESULT

The expected wavelength of sodium vapour lamp is 589.5 nm.
Experimentally, the wavelength, λ was found to be
$598.16 \pm 3.25\%$ (standard deviation of the slope).
Accuracy error is 1.5%, within the precision.

ORDER OF DARK RING m	LEFT (CM)	RIGHT (CM)
6	5.800	6.260
9	5.755	6.304
12	5.720	6.350
13	5.704	6.360
14	5.700	6.370
15	5.670	6.382
16	5.665	6.400
19	5.650	6.420
23	5.605	6.459
25	5.600	6.467

Table 1: Diameter of Newton's Ring

MAIN SCALE (CM)	VERNIER SCALE DIVISION	READING (CM)
OUTER l		
4.6	34	4.668
4.6	35	4.670
4.6	34	4.668
INNER l		
3.8	37	3.874
3.8	38	3.876
3.8	37	3.874

Table 2: Measurement of l of spherometer

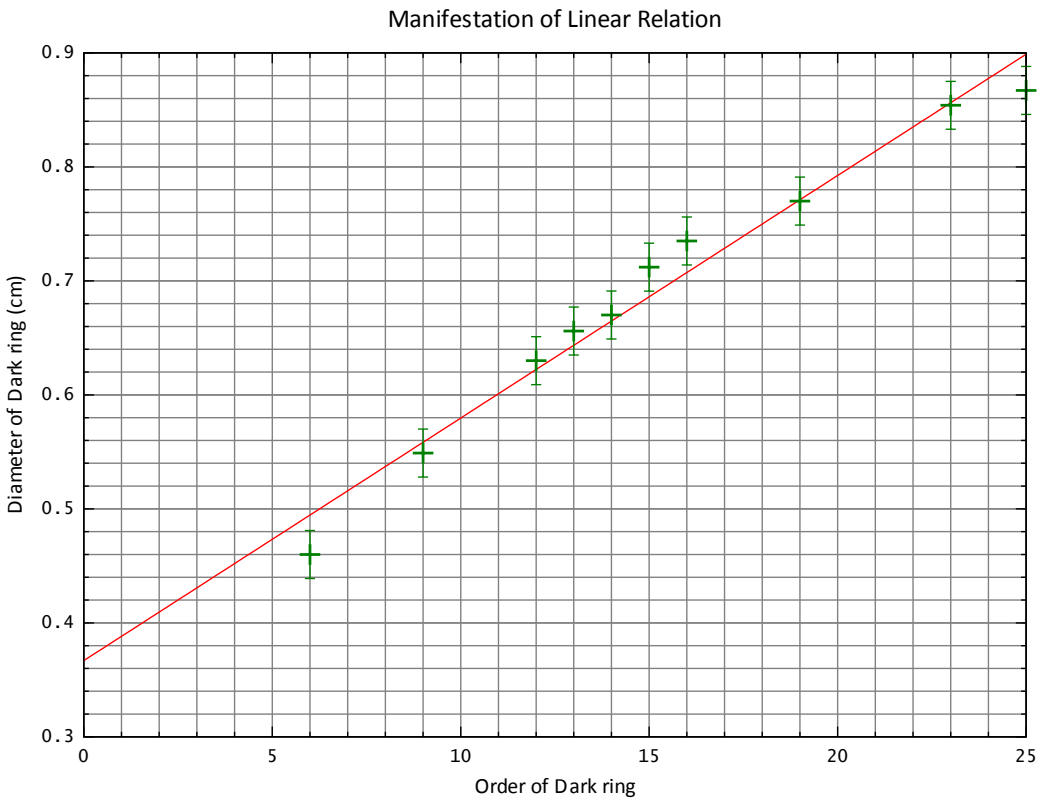

Figure 1: Least Square Fit of Diameter Squared vs Order of Ring

Part II

THE SHOWCASE

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COLOPHON

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The style was inspired by Robert Bringhurst's seminal book on typography "*The Elements of Typographic Style*".

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https://github.com/toAtulArora/IISER_repo