

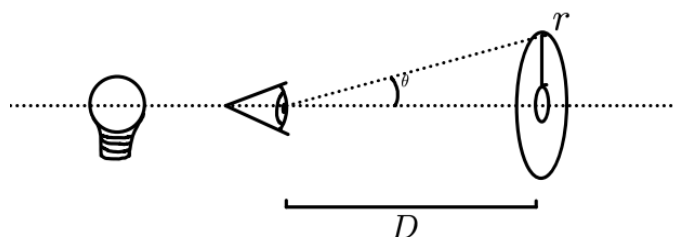
OCR A Physics A-level

PAG 5.4

Determining Wavelength Using Diffraction From a CD

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Equipment

- A Rule
- A CD (or DVD)
- A lightsource/lamp

Method

1. Measure the distance, r , from the centre of the CD to the edge of the CD.
2. Choose a colour of light you would like to calculate the wavelength for, for example red light.
3. As seen in the figure, move the CD away from your eye until the red light is on the edge of the CD.
4. Measure this distance, D .
5. Repeat for other colours of light.

Calculations

- Calculate the angle of diffraction, θ , using trigonometry: $\theta = \arctan\left(\frac{r}{D}\right)$.
- By using a variety of different colours of light and their diffraction angles calculate the ratio between wavelengths. For example, $\frac{\lambda_{red}}{\lambda_{green}} = \frac{r \sin(\theta_{red})}{r \sin(\theta_{green})} = \frac{\sin(\theta_{red})}{\sin(\theta_{green})}$.
- Compare these ratios with accepted values and calculate the uncertainty.

Safety

- Do not stare at the lamp for long periods of time.
- The lamp may get hot.

Notes

- Should you wish to go further, the value of d can be calculated by looking up accepted values of λ and graphing λ against $\sin(\theta)$ - d will be the gradient.

