

Interference and Diffraction

Spoken Tutorial Project

<https://spoken-tutorial.org>

National Mission on Education through ICT

<http://sakshat.ac.in>

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Learning Objectives



Learning Objectives

- **Verify the relation between wavelength and relative intensity**



Learning Objectives

- **Verify the relation between wavelength and relative intensity**
- **Find the relation between slit width, maxima and minima**



Learning Objectives

- Verify the relation between wavelength and relative intensity
- Find the relation between slit width, maxima and minima
- Calculate the angle for the given maxima



Learning Objectives



Learning Objectives

- Interpret diffraction intensity profile



Learning Objectives

- Interpret diffraction intensity profile
- Verify the relation between wavelength and angle



System Requirements



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- **Ubuntu Linux OS v 16.04**



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- **Ubuntu Linux OS v 16.04**
- **Firefox Web Browser v 62.0.3**



Pre-requisites



Pre-requisites

- Learner should be familiar with **Apps on Physics**



Pre-requisites

- Learner should be familiar with **Apps on Physics**
- For pre-requisites tutorials please visit this site
<https://spoken-tutorial.org>



Apps on Physics



Apps on Physics

- **Interference of Light at a Double Slit**



Apps on Physics

- **Interference of Light at a Double Slit**
- **Diffraction of Light by a Single Slit**



Angle



Angle

- $\alpha = \sin^{-1}(k\lambda/d)$



Angle

- $\alpha = \sin^{-1}(k\lambda/d)$
- $k = 1$



Angle

- $\alpha = \sin^{-1}(k\lambda/d)$
- $k = 1$
- $\lambda = 600 \text{ nm}$ & $d = 1000 \text{ nm}$



Angle

- $\alpha = \text{Sin}^{-1}(k\lambda/d)$
- $k = 1$
- $\lambda = 600 \text{ nm}$ & $d = 1000 \text{ nm}$
- $\alpha = \text{Sin}^{-1}(k\lambda/d)$
 $= \text{Sin}^{-1}(1 \times 600/1000)$
 $= \text{Sin}^{-1}(3/5)$
 $= 36.86$



Assignment



Assignment

- **Change the spacing between slits to 3500 nm**



Assignment

- Change the spacing between slits to 3500 nm
- Calculate the angle of fourth and fifth maxima



Tabular Column



Tabular Column

Wavelength= 600 nm

Width of slit= 3000 nm

Maxima	Relative Intensity	Minima	Relative Intensity
$k=0$	1	$k=0$	0
$k=1$	0.0472	$k=1$	0
$k=2$	0.0165	$k=2$	0
$k=3$	0.0083	$k=3$	0
$k=4$	0.0050	$k=4$	0



Assignment



Assignment

- Change the wavelength to 380 nm and width of slit to 5000 nm



Assignment

- Change the wavelength to 380 nm and width of slit to 5000 nm
- Use the table as shown earlier in this tutorial for your reference



Assignment

- Change the wavelength to 380 nm and width of slit to 5000 nm
- Use the table as shown earlier in this tutorial for your reference
- Tabulate the total number of maxima and minima



Assignment



Assignment

- For each maxima tabulate the value of relative intensity from the App



Assignment

- For each maxima tabulate the value of relative intensity from the App
- Explain the diffraction pattern



Assignment



Assignment

- Differentiate between interference and diffraction patterns



Summary



Summary

- Verified the relation between wavelength and relative intensity
- Found the relation between slit width, maxima and minima
- Calculated the angle for the given maxima



Summary



Summary

- Interpreted diffraction intensity profile
- Verified the relation between wavelength and angle



Acknowledgement

- These Apps were created by **Walter-fendt** and his team



About the Spoken Tutorial Project

- Watch the video available at https://spoken-tutorial.org/What_is_a_Spoken_Tutorial
- It summarises the Spoken Tutorial project



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Spoken Tutorial Workshops

The Spoken Tutorial Project Team

- Conducts workshops using spoken tutorials
- Gives certificates to those who pass an online test
- For more details, please write to contact@spoken-tutorial.org



Forum for specific questions

- Questions in THIS Spoken Tutorial?
- Visit <https://forums.spoken-tutorial.org>
- Choose the minute and second where you have the question
- Explain your question briefly
- The Spoken Tutorial project will ensure an answer

You will have to register to ask questions



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