13.S: Interference (Summary)

Key Terms

coherent waves	waves are in phase or have a definite phase relationship
fringes	bright and dark patterns of interference
incoherent	waves have random phase relationships
interferometer	instrument that uses interference of waves to make measurements
monochromatic	light composed of one wavelength only
Newton's rings	circular interference pattern created by interference between the light reflected off two surfaces as a result of a slight gap between them
order	integer m used in the equations for constructive and destructive interference for a double slit
principal maximum	brightest interference fringes seen with multiple slits
secondary maximum	bright interference fringes of intensity lower than the principal maxima
thin-film interference	interference between light reflected from different surfaces of a thin film

Key Equations

Constructive interference	$\Delta l = m\lambda$, for **m** = 0, ±1, ±2, ±3…
Destructive interference	$\Delta l = (m + \frac{1}{2})\lambda$, for **m** = 0, ±1, ±2, ±3…
Path length difference for waves from two slits to a common point on a screen	$\Delta l = d\ sin\ \theta$
Constructive interference	$d\ sin\ \theta = m\lambda$, for **m** = 0, ±1, ±2, ±3…
Destructive interference	$d\ sin\ \theta = (m + \frac{1}{2})\lambda$, for **m** = 0, ±1, ±2, ±3…
Distance from central maximum to the **m**-th bright fringe	$y_m = \frac{m\lambda D}{d}$
Displacement measured by a Michelson interferometer	$\Delta d = m\frac{\lambda_0}{2}$

Summary

3.1: Young's Double-Slit Interference

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