

Quiz 2

$$1 \text{ nm} = 1 \times 10^{-9} \text{ m}$$
$$c = 3 \times 10^8 \text{ m/s}$$

Interference of two sources that are in phase:

$$\text{Constructive: path difference} = |L_1 - L_2| = \Delta L = m\lambda$$
$$\text{Destructive: path difference} = |L_1 - L_2| = \Delta L = \left(m + \frac{1}{2}\right)\lambda$$

Young's double slit experiment.

$$\text{bright fringes at } d \sin \theta = m\lambda \quad y_m \approx \frac{m\lambda L}{d} \quad m=0, 1, 2, \dots$$
$$\text{dark fringes at } d \sin \theta = \left(m + \frac{1}{2}\right)\lambda \quad y'_m \approx \left(m + \frac{1}{2}\right)\frac{\lambda L}{d} \quad m=0, 1, 2, \dots$$

Single slit diffraction:

$$w = \frac{2\lambda L}{a}$$
$$a \sin(\theta) = m\lambda \quad m = 1, 2, 3, \dots \text{for dark fringes}$$
$$y_m \approx \frac{m\lambda L}{a} \quad m = 1, 2, 3, \dots \text{for dark fringes and small angles}$$

Thin film interference.

$$\text{Constructive: 0 or 2 phase changes} \quad \Delta L = 2t = m \frac{\lambda}{n_{film}}$$
$$\text{Destructive: 0 or 2 phase changes} \quad \Delta L = 2t = \left(m + \frac{1}{2}\right) \frac{\lambda}{n_{film}}$$
$$\text{Constructive: 1 phase change} \quad \Delta L = 2t = \left(m + \frac{1}{2}\right) \frac{\lambda}{n_{film}}$$
$$\text{Destructive: 1 phase change} \quad \Delta L = 2t = m \frac{\lambda}{n_{film}}$$

speed of light:

$$v = \frac{c}{n}$$
$$v = \lambda f$$
$$\lambda = \frac{\lambda_{vacuum}}{n}$$

Critical Angle

$$\sin(\theta_c) = \frac{n_2}{n_1} \quad \text{for } n_1 > n_2$$

spherical mirror: $f = R/2$

linear magnification:

$$m = \frac{-d_i}{d_o} = \frac{h_i}{h_o}$$

Refractive power in diopters ($1 \text{ D} = m^{-1}$)

$$P = \frac{1}{f}$$