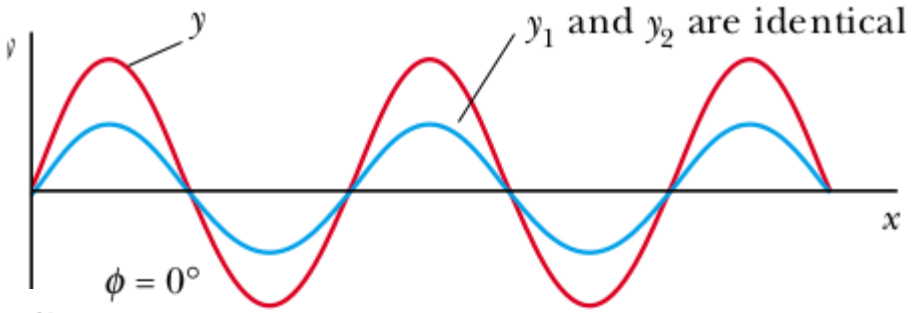
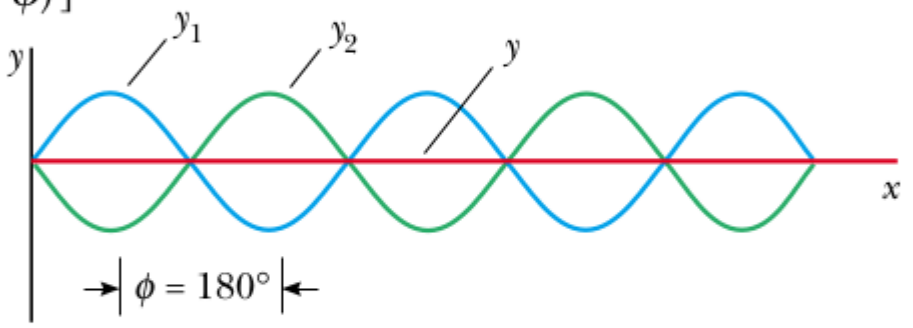
# Interferencia




(a)

$$y_1 = A\sin(kx - \omega t) \qquad y_2 = A\sin(kx - \omega t + \phi)$$

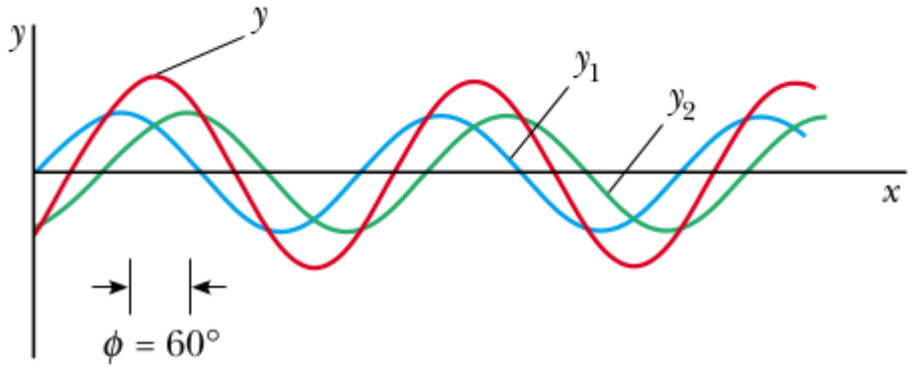
$$y = y_1 + y_2 = A[\sin(kx - \omega t) + \sin(kx - \omega t + \phi)]$$




(b)

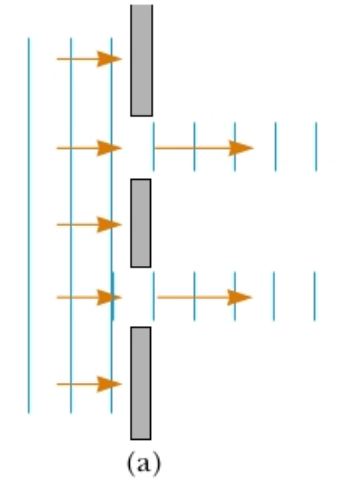
$$\sin a + \sin b = 2\cos\left(\frac{a-b}{2}\right)\sin\left(\frac{a+b}{2}\right)$$

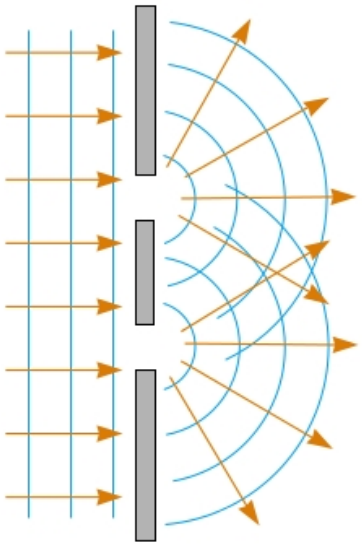
$$y = 2A\cos\left(\frac{\phi}{2}\right)\sin\left(kx - \omega t + \frac{\phi}{2}\right)$$




(c)

# Interferencia

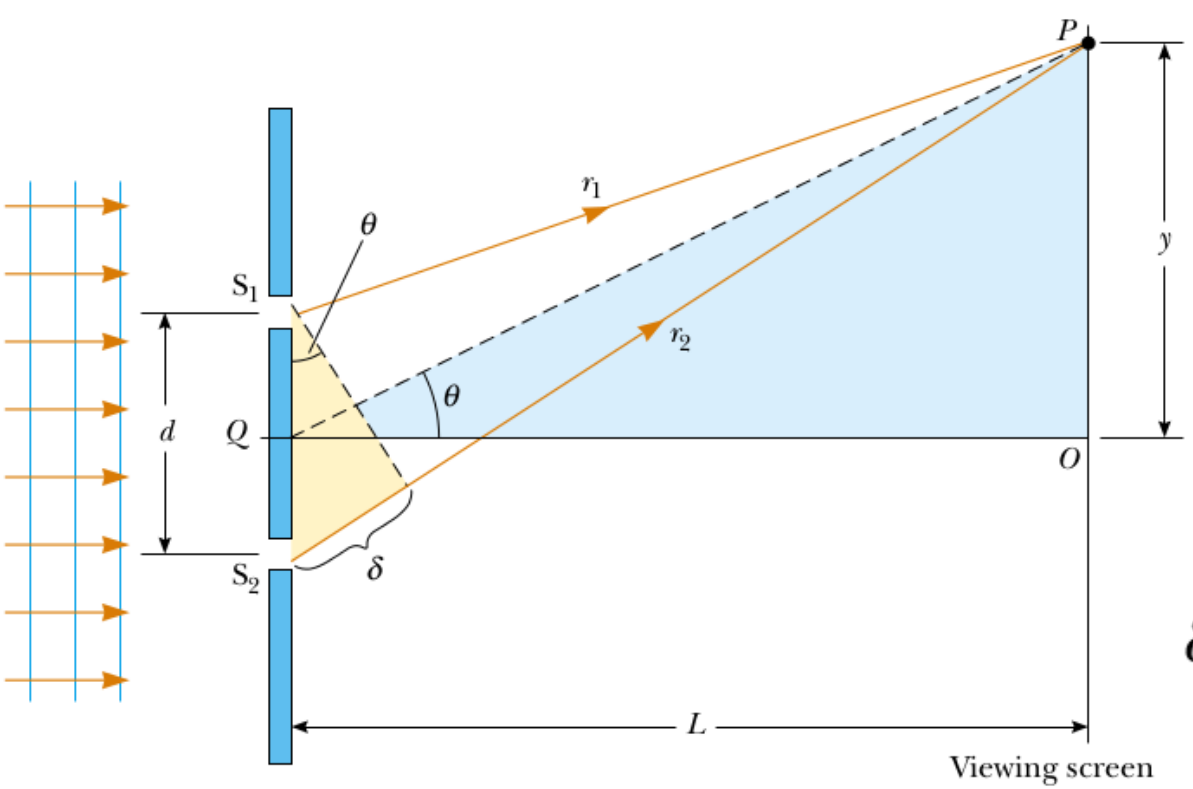


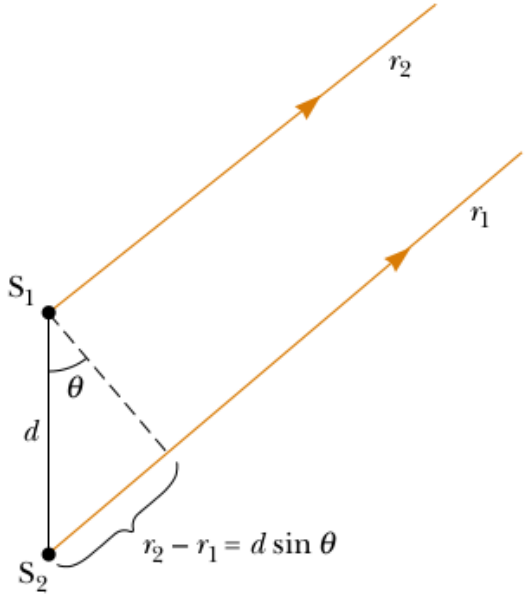



Courtesy of Sabina Zigman/Benjamin Cardozo High School

At a beach in Tel Aviv, Israel, plane water waves pass through two openings in a breakwall. Notice the diffraction effect—the waves exit the openings with circular wave fronts, as in Figure 37.1b. Notice also how the beach has been shaped by the circular wave fronts.

# Experiencia de Young




$$\delta = r_2 - r_1 = d\sin\theta$$

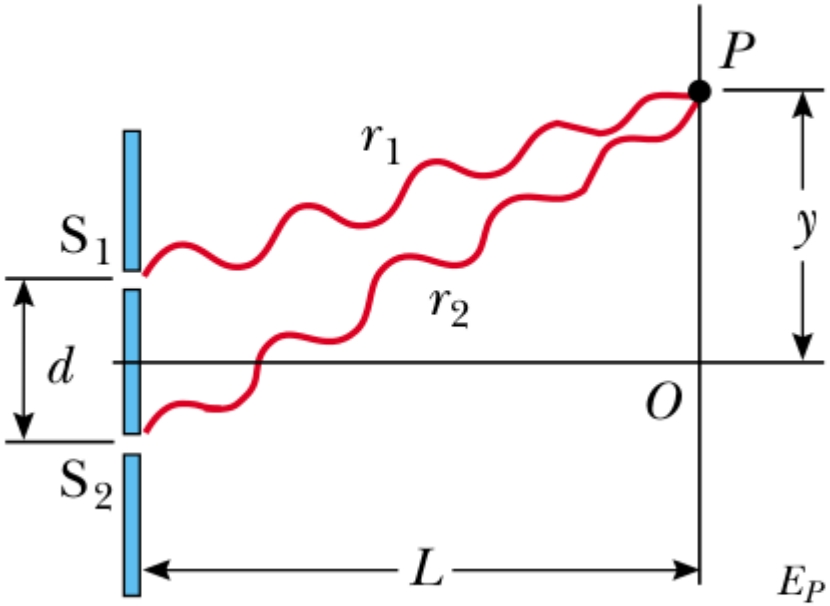
(b)

$$\delta = d\sin\theta_{\text{bright}} = m\lambda \qquad (m = 0, \pm 1, \pm 2, \ldots)$$

$$d\sin\theta_{\text{dark}} = (m + \tfrac{1}{2})\lambda \qquad (m = 0, \pm 1, \pm 2, \ldots)$$

# Experiencia de Young: Intensidad

$$E_1 = E_0 \sin \omega t \qquad \text{and} \qquad E_2 = E_0 \sin(\omega t + \phi)$$




$$\frac{\delta}{\lambda} = \frac{\phi}{2\pi}$$

$$\phi = \frac{2\pi}{\lambda}\,\delta = \frac{2\pi}{\lambda}\,d \sin\theta$$

$$E_P = E_1 + E_2 = E_0[\sin \omega t + \sin(\omega t + \phi)]$$

$$\sin a + \sin b = 2 \cos\left(\frac{a-b}{2}\right) \sin\left(\frac{a+b}{2}\right)$$

$$E_P = 2E_0 \cos\left(\frac{\phi}{2}\right) \sin\left(\omega t + \frac{\phi}{2}\right)$$

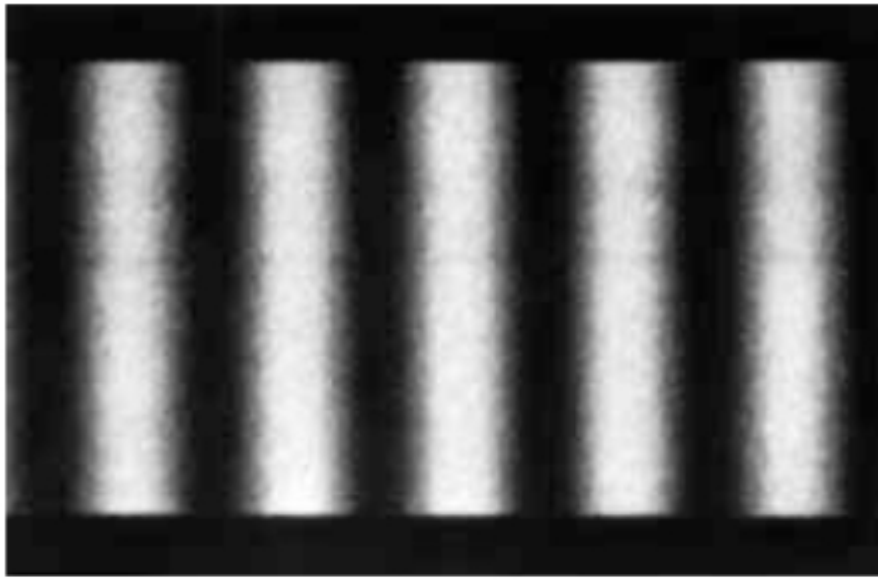
# Intensidad

$$I \propto E_P^2 = 4E_0^2 \cos^2\left(\frac{\phi}{2}\right) \sin^2\left(\omega t + \frac{\phi}{2}\right)$$

$$I = I_{\max} \cos^2\left(\frac{\phi}{2}\right)$$

$$I = I_{\max} \cos^2\left(\frac{\pi d \sin\theta}{\lambda}\right)$$

$$I \approx I_{\max} \cos^2\left(\frac{\pi d}{\lambda L}\, y\right)$$



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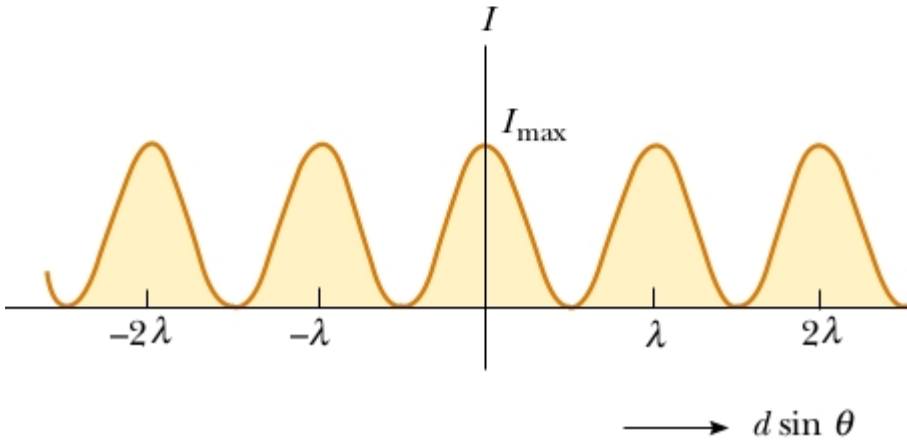
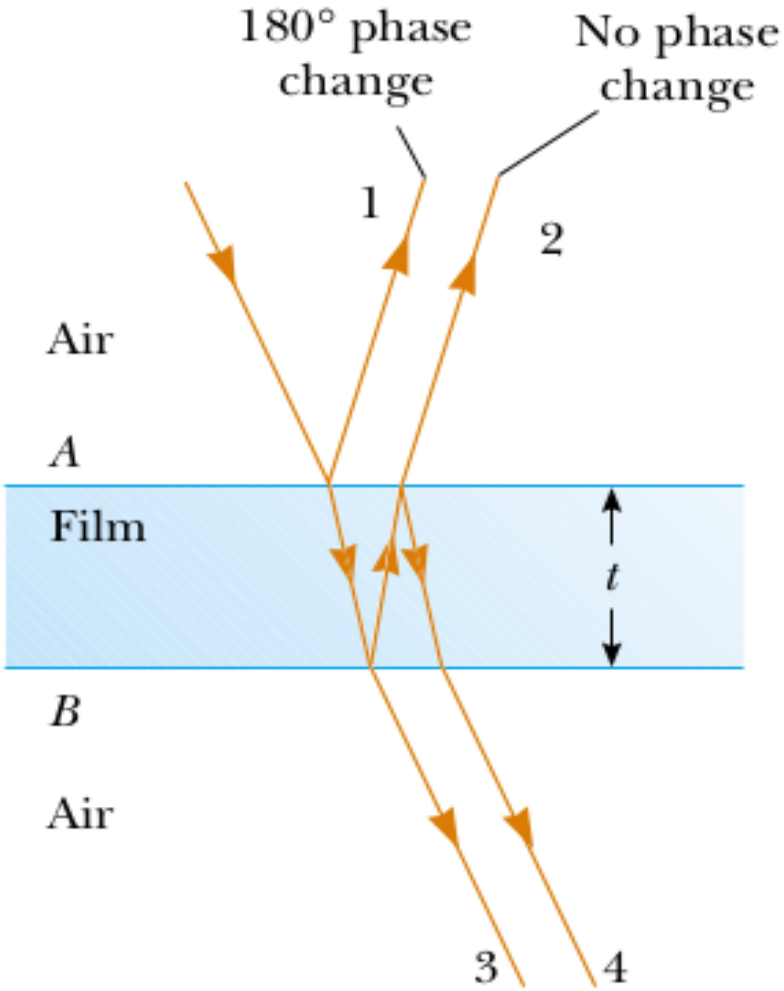
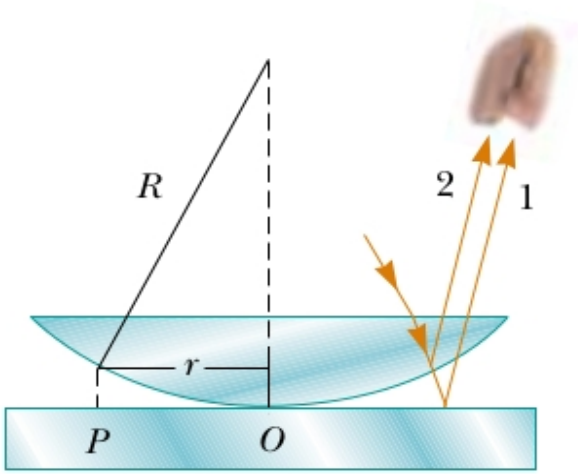


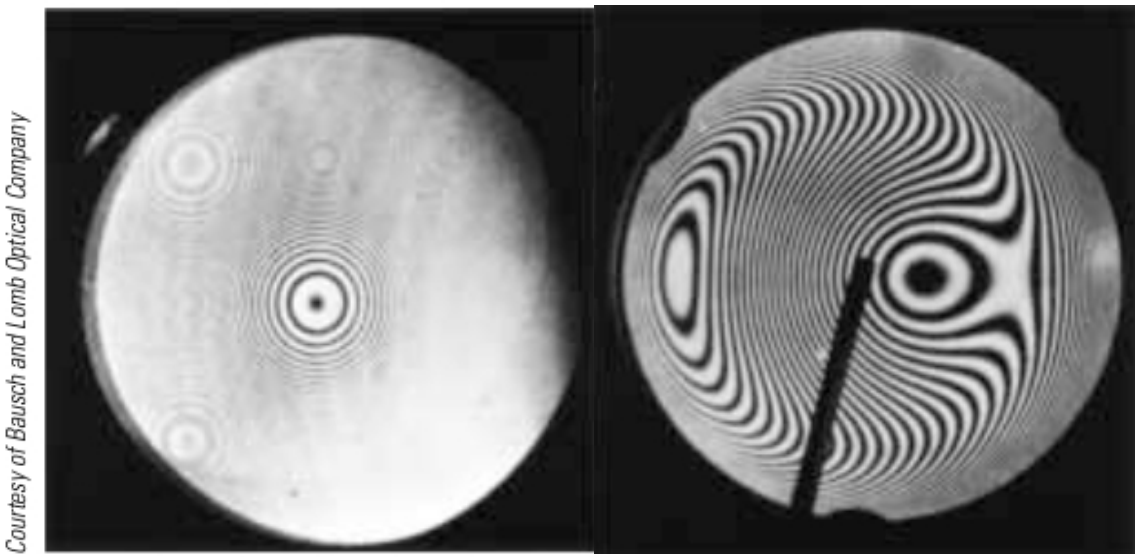
# Interferencia en films delgados




# Anillos de Newton

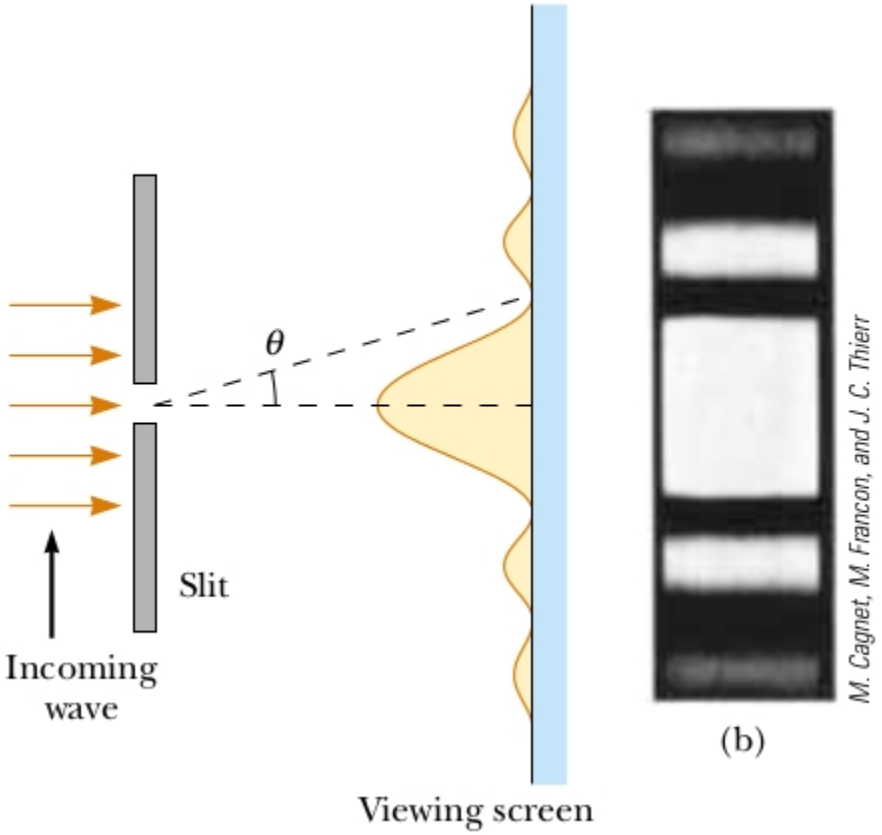



(a)




(b)

# Difracción






(b)

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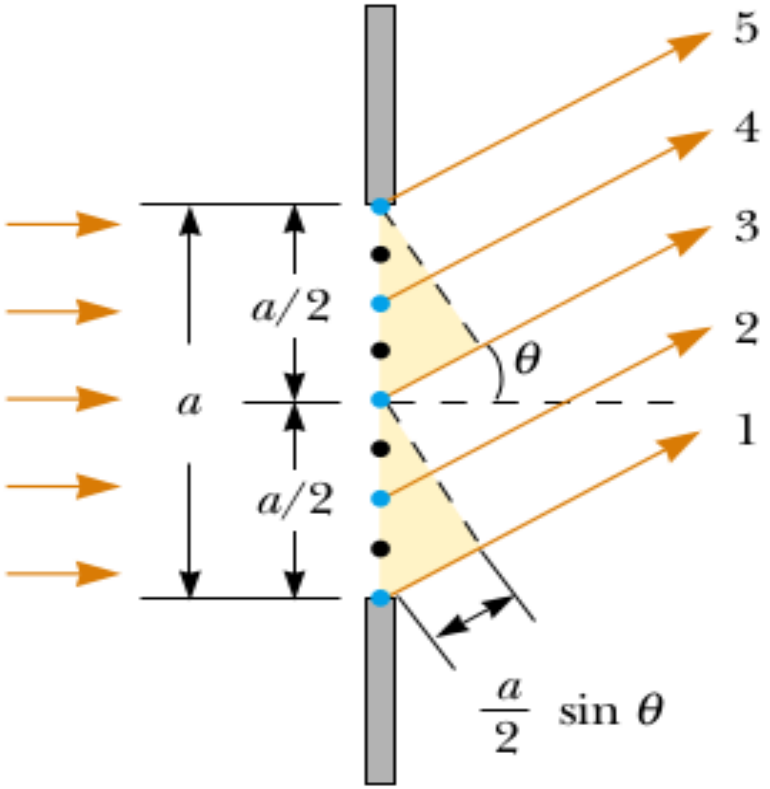
# Difracción



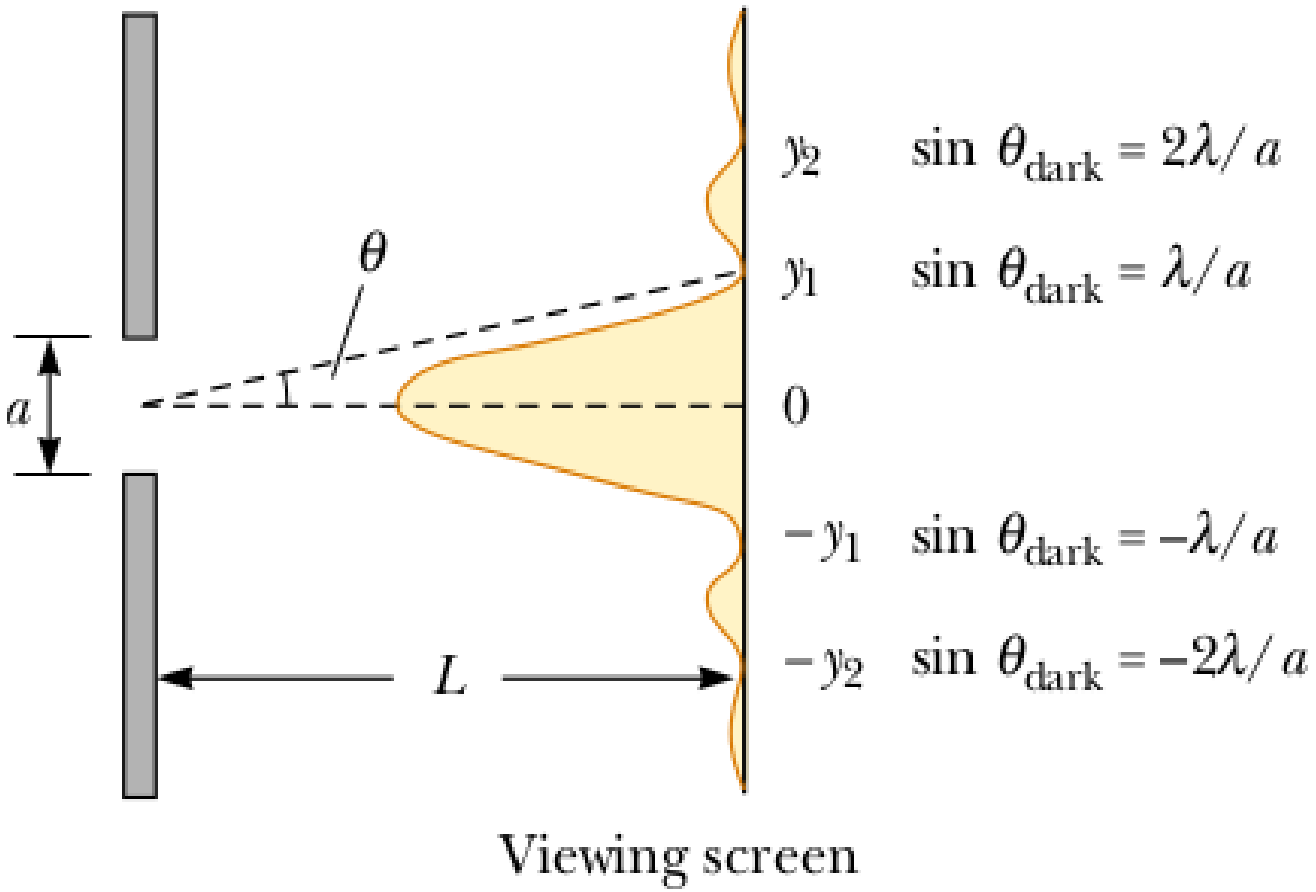

$$\frac{a}{2}\sin\theta = \pm\frac{\lambda}{2}$$

$$\sin\theta = \pm\frac{2\lambda}{a}$$

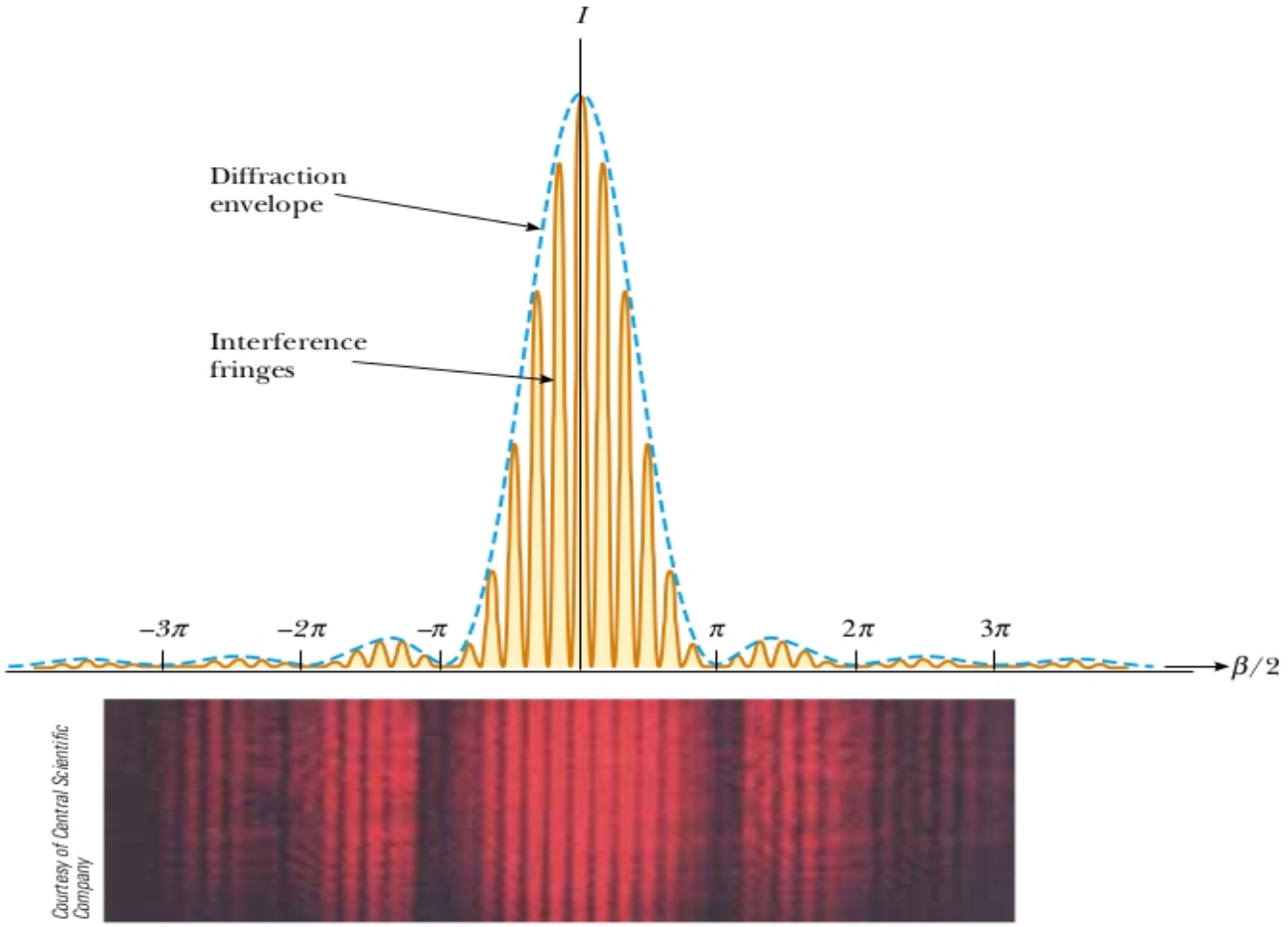
$$\sin\theta = \pm\frac{3\lambda}{a}$$

$$\sin\theta_{\text{dark}} = m\frac{\lambda}{a} \qquad m = \pm 1, \pm 2, \pm 3, \ldots$$

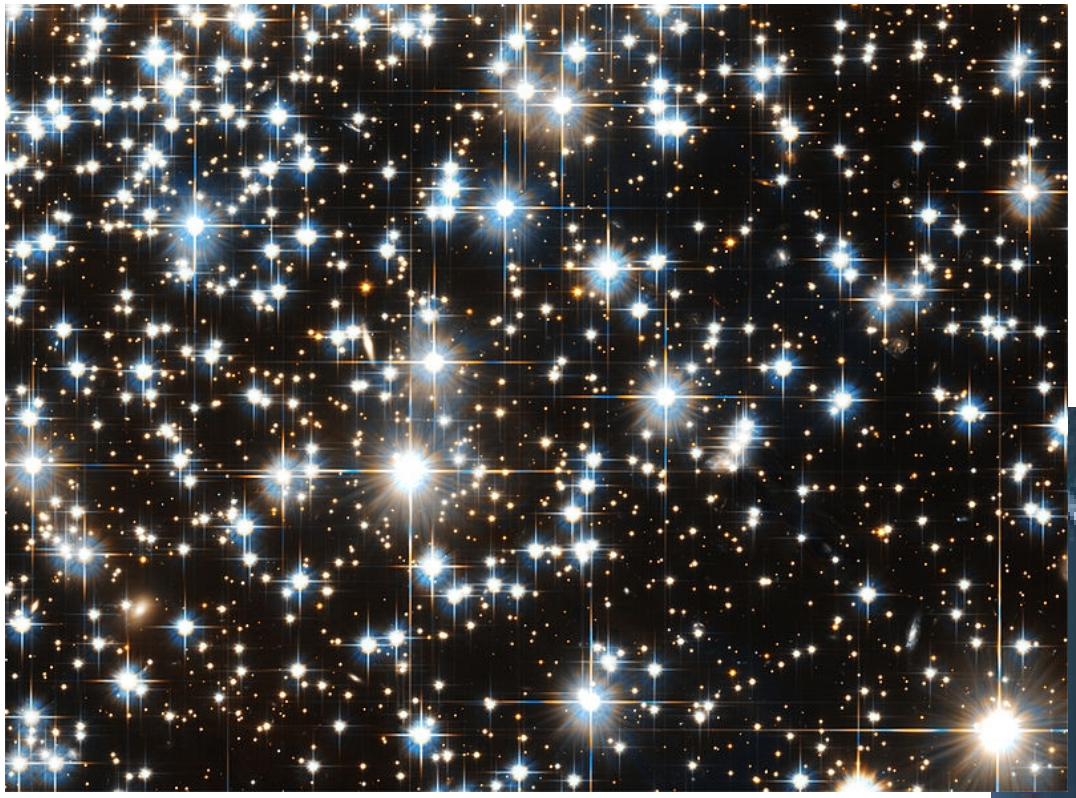
# Difracción

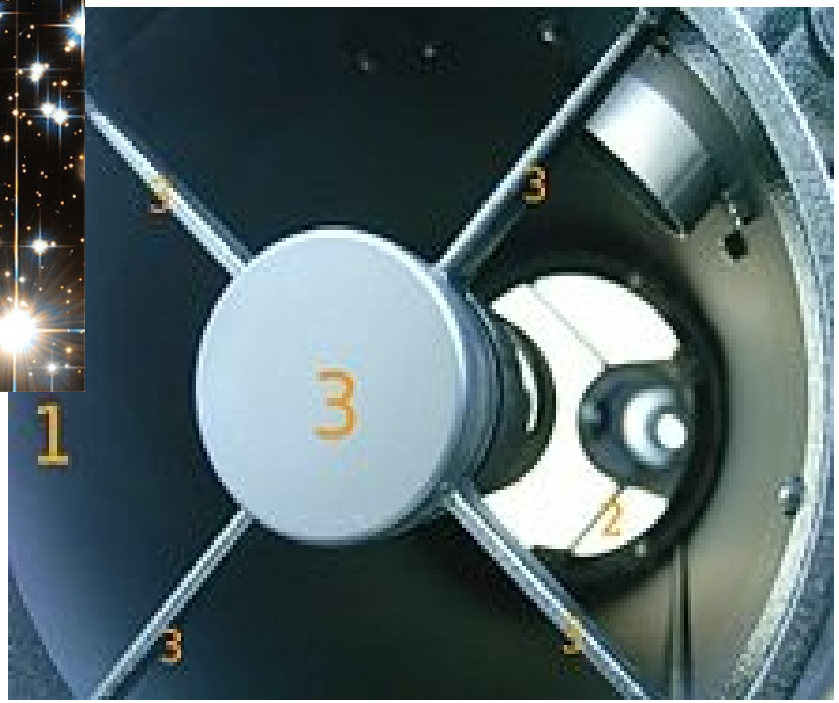

θ
a
L
$y_2$
$y_1$
0
$-y_1$
$-y_2$
$\sin\theta_{dark} = 2\lambda/a$
$\sin\theta_{dark} = \lambda/a$
$\sin\theta_{dark} = -\lambda/a$
$\sin\theta_{dark} = -2\lambda/a$
Viewing screen

# Difracción e Interferencia de dos rendijas

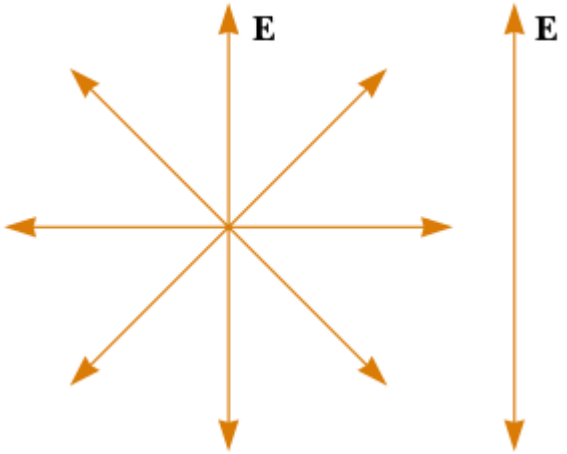


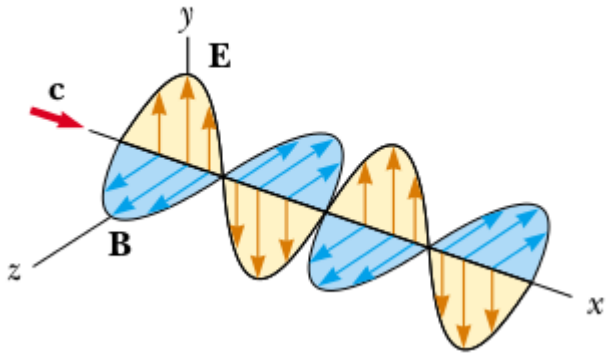
# Difracción

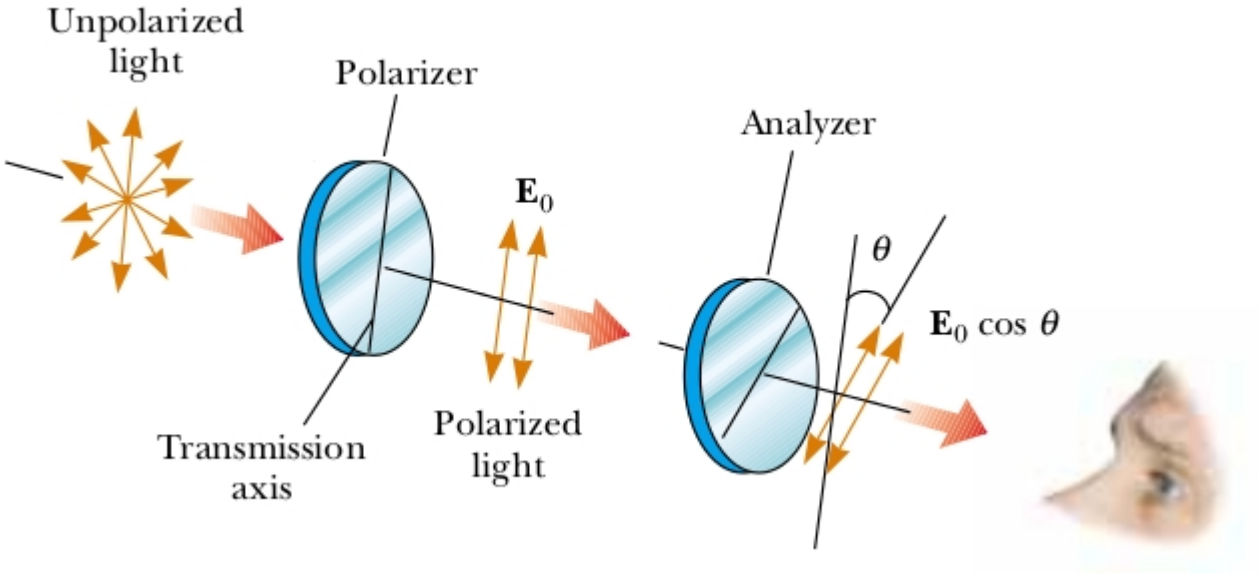




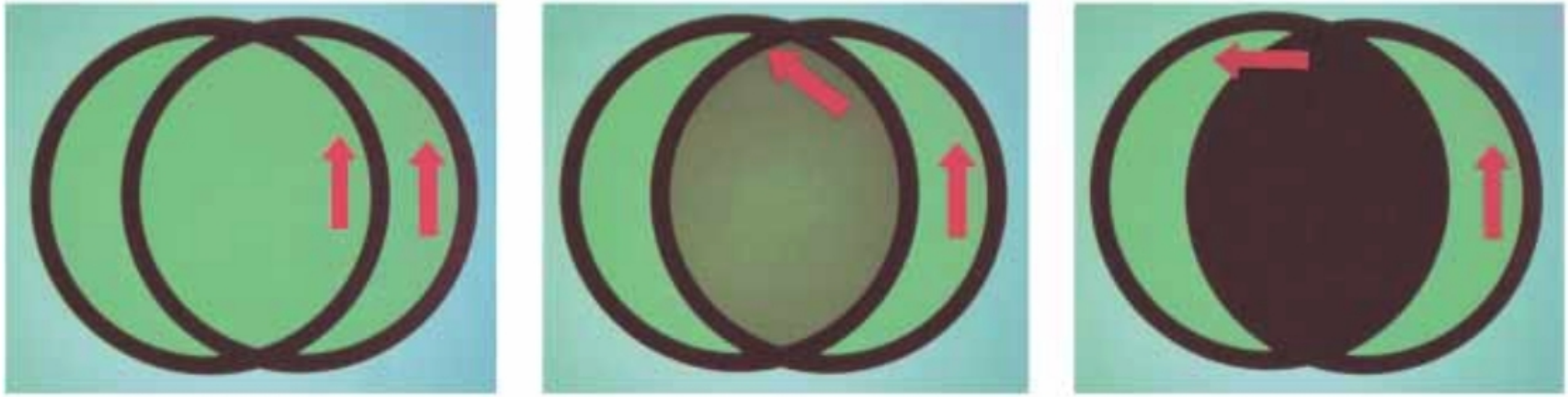
# Polarización



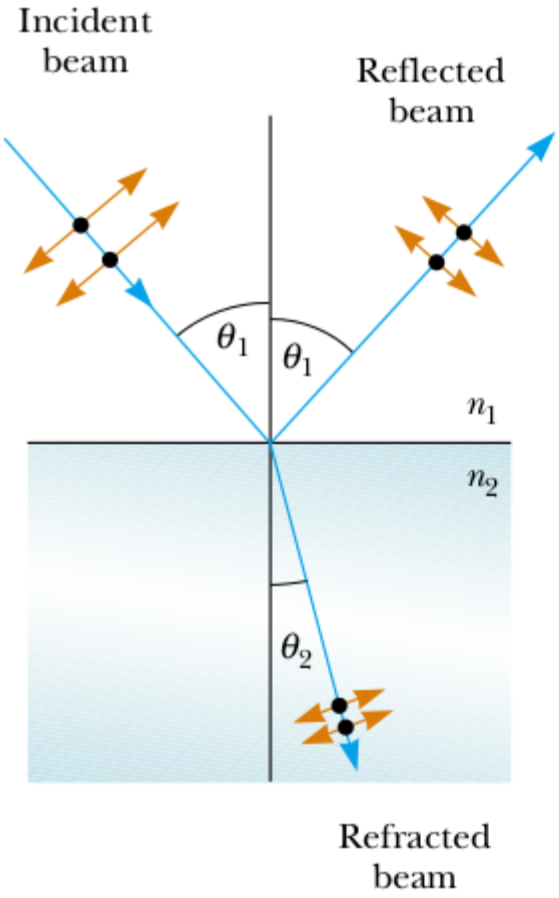



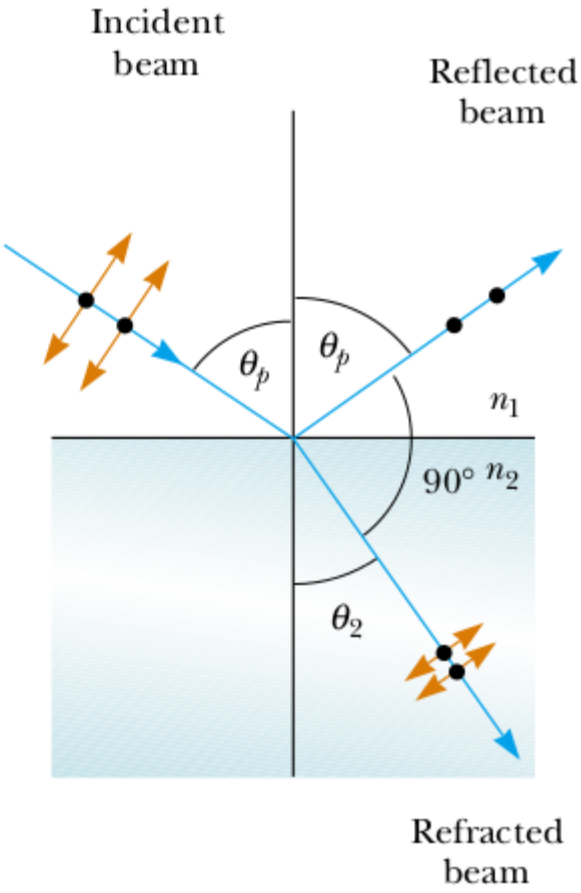



# Polarización



# Polarización por reflexión




$$n = \tan\theta_p$$